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IDENTIFICATION FRIEND FOE OR NEUTRAL JAN 84

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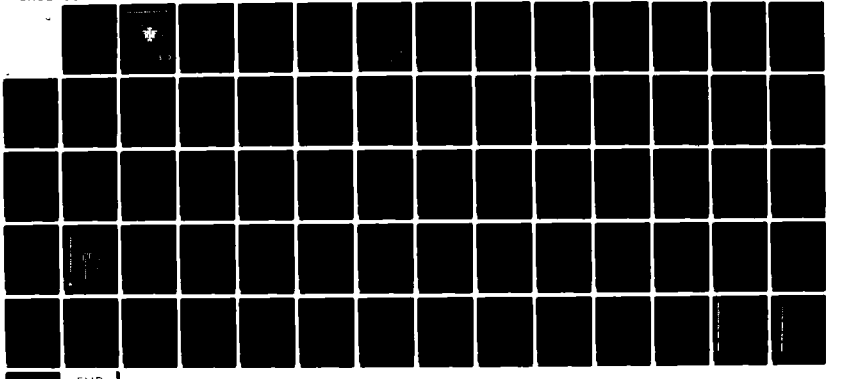

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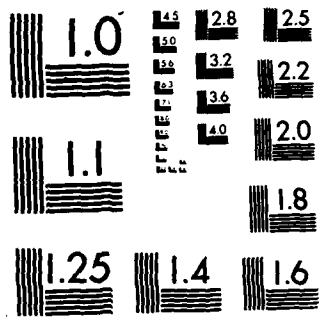

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

PROGRAM MASTER PLAN

JANUARY 1984

RECORD OF CHANGES

Change No	Date	Title or Brief Description	Entered by/ Initials	Date of Entry

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1.0 Program Summary

1.1 Authority: The Identification Friend, Foe, or Neutral Joint Test and Evaluation (IFFN JT&E) is directed by the Director, Defense Test and Evaluation, Office of the Under Secretary of Defense for Research and Engineering (OUSDRE/DDT&E) through the Charter of the Joint Test Director, 12 July 1979, as approved by the Assistant Secretaries for the Air Force, Army, and Navy and implemented by the Air Force Test Directive thru HQ United States Air Force message DTG 162030Z Jul 80.

1.2 Purpose: The purpose of the IFFN JT&E is to assess baseline US capabilities within the North Atlantic Treaty Organization (NATO) air defense command and control (C^2) system to perform the IFFN function, identify deficiencies in the performance of that function, and propose potential near-term procedural and equipment modifications for further testing. The purpose of this document is to serve as an internal management tool, provide an overview of the objectives, background, concept of execution, resource requirements, and acquisition concept of the IFFN JT&E and to provide an umbrella document identifying the roles of all participating agencies.

1.3 Background: It is widely recognized that the inability of operators of air defense systems to discriminate accurately and rapidly between friendly, hostile and neutral aircraft significantly limits the effective utilization of these systems. This recognition has stimulated activity within NATO to develop an effective NATO Identification System (NIS).

In 1975 the Defense Science Board issued a report detailing problems associated with target identification for employment of beyond-visual-range (BVR) air defense weapons. Based on their report, the Deputy Secretary of Defense directed the Joint Chiefs of Staff (JCS) to incorporate the evaluation of the identification function into field exercises and the Office of the Secretary of Defense (OSD) to integrate the identification function with the C^2 process both organizationally and operationally.

The Institute for Defense Analyses (IDA) was tasked to further study these issues. IDA recommended establishing the IFFN JT&E program. In July 1979, the DDT&E issued the Charter for the Identification, Friend, Foe, Neutral Joint Test and Evaluation Program naming the Air Force as the Executive Service and included requirements for Air Force, Army, and Navy Deputy Test Directors to be assigned to the Joint Test Force (JTF) located at Kirtland Air Force Base, New Mexico. IDA has been tasked by DDT&E to develop the test concept and design which will be coordinated with the services and the Joint Test Director (JTD).

1.4 Objectives, Issues, and Impact

1.4.1 Objectives

During the test planning phase, specific objectives along with appropriate methodology, measures of effectiveness, measures of performance, and data elements will be developed to satisfy the issues identified below.

1.4.2 Issues

The IFFN JT&E will address the two major operational issues identified

below. A more thorough discussion of the two major issues to include their supporting rationale and additional specific issues is contained in the IFFN Test Concept Paper and will be further amplified in the Field Test Plan.

1.4.2.1 Major Operational Issue 1. What is the contribution of indirect identification information to the ability of US air defense command and control systems operating in NATO to correctly identify airborne targets, use identification in performing target allocation, and aid subordinate air defense weapons systems in performing target acquisition?

1.4.2.2 Major Operational Issue 2. What are the weaknesses in the collection, formation, dissemination, and use of indirect identification information for which solutions are not currently planned?

1.4.3 Impact

a. Satisfying the first major operational issue will provide a baseline assessment of the expected identification performance of a representative air defense system operating in the Fourth Allied Tactical Air Force (4ATAF) area in a wartime environment, with results applicable to other joint and combined environments. It will also provide a fuller understanding of the relationship of identification performance of the command and control system to the performance of the overall active air defense mission. This understanding should also provide an empirical data base which can assist the Services and OSD in the formulation of verification of operational requirements for identification and point to possible weaknesses in projected "baseline" capability.

b. Satisfying the second major operational issue will identify weaknesses in the identification process and allow for a qualitative comparison of weaknesses identified during testing, with existing programmed solutions for these weaknesses (Service, OSD, and NATO input of ongoing and proposed identification program information being required to conduct this comparison). It should also be possible to postulate potential corrective actions for those deficiencies that are identified that currently lack a programmed solution. These recommended corrective actions could take the form of doctrinal or procedural changes, system software changes, communications connectivity changes, addition of new data sources, or various combinations of these remedies. Upon Service and OSD review of these recommendations and their subsequent input of additional test issues, follow-on testing can be proposed, scheduled, and conducted using the IFFN Testbed and acquired data base for comparisons.

1.5 Operational Testing Concept

The concept for operational testing under the IFFN JT&E program is to replicate, through a computerized testbed, those operational weapon and command and control system configurations which will be in the field in the 1985-1986 time-frame.

Accomplishment of the test objectives involves two major facets:

a. Development of the Evaluation Testbed System (ETS)

b. Conduct of testing

In order to minimize technical and program risks, a phased testbed acquisition has been adopted and is further explained in Section 7.

The test approach is based on seven series of testing. The series will consist of the following weapons systems, command and control systems, and associated data links:

a. Series 1: System Checkout

PATRIOT Fire Unit (FU)

PATRIOT Air Defense Information Language (PADIL)

b. Series 2: PATRIOT FU

PATRIOT Battalion Fire Direction Center (Bn FDC)

PADIL

c. Series 3: PATRIOT FU

PATRIOT Bn FDC

PATRIOT Brigade Fire Direction Center (Bde FDC)

PADIL

Army Tactical Data Link - 1 (ATDL 1)

d. Series 4: F-15 "Eagle" Interceptor

e. Series 5: F-15

USAF Control and Reporting Post/Message Processing Center (CRP/MPC)

NATO Airborne Early Warning System (NE-3A)

Special Information System (SIS)

TADIL-A

TADIL-B

f. Series 6: PATRIOT FU

PATRIOT Bn FDC

PATRIOT Bde FDC

F-15

NE-3A

CRP

SIS

TADIL-A

TADIL-B

PADIL

ATDL-1

NATO Link-1

g. Series 7: PATRIOT FU

PATRIOT Bn FDC

PATRIOT Bde FDC

F-15

NE-3A

CRP

SIS

NATO Control and Reporting Center (CRC)

TADIL-A

TADIL-B

PADIL

ATDL-1

NATO Link-1

1.6 Testbed Concept: Two major options were considered during feasibility studies when developing the test concept: field exercises and computer-based simulation. Both have strong and weak points which can be compared. A hybrid approach was ultimately selected, which permits us to capture the best of both options. The concept is centered around live operators using actual tactical hardware or accepted simulations/simulators of hardware/software identified as Live Participating Units (LPUs). Real-time computer models stimulate the LPUs as well as represent the background workload for these units. This man-in-the-loop simulation will be carried out through the creation of the ETS. To implement this test concept a distributed testbed is to be established. A central facility will generate and distribute the tactical scenario, control test execution, and monitor the response of geographically distributed LPUs participating in the tests.

Those candidate units to be represented by tactical equipment or

simulations/simulators of the tactical equipment and their proposed location are listed below:

U.S. Army PATRIOT Fire Unit	Ft Bliss TX
U.S. Army PATRIOT Battalion Fire Direction Center	Ft Bliss TX
U.S. Army PATRIOT Brigade Fire Direction Center	Ft Bliss TX
U.S. Air Force F-15 Interceptor Aircraft	Multipurpose Fighter Facility, Kirtland AFB NM
U.S. Air Force Control and Reporting Post/ Message Processing Center	Hurlburt Field FL
NATO Airborne Early Warning System	Boeing Avionics Integration Laboratory, Seattle WA
NATO Control and Reporting Center	Decision on the specific NATO CRC to be represented in the testbed is still pending the resolution of several programmatic issues.

Other systems necessary for the test (but represented by manned simulations located at the Central Simulation Facility (CSF) at Kirtland AFB) include, but are not limited to, the Special Information System (SIS), Manual Input Facility (MIF), and NATO Air Defense Ground Environment (NADGE) System.

At the request of the Army, DDT&E in conjunction with the JTD and the JTF staff is investigating the feasibility of incorporating the Army HAWK System within the IFFN JT&E. When the programmatic issues of operational requirements, schedule, affordability, and funding responsibilities are resolved, this document will be updated to incorporate the HAWK System.

2.0 Participating Organizations

2.1 Joint Test Force

2.1.1 JTF Composition

The JTF consists of the JTD, a Service deputy from each of the Participating Services, and personnel from each of the Services to plan, conduct and support the test. The JTD has overall responsibility for the implementation of the Test Directive and is responsible to the DDT&E. The JTF external relationships are shown in Figure 2.1.

Each Service deputy is the representative for his Service through the Services test and evaluation agency (Air Force-AFOTEC, Army-OTEA). Additionally each Deputy Test Director serves in a functional position on the JTF staff as manager over the staff directorates. Figure 2.2 shows the current relationship.

Despite active Navy participation early in the IFFN program, the Nav elected to withdraw support for the program due to unresolveable programma issues."

2.1.2 JTF Responsibilities

The IFFN JTF is responsible for acquiring a testbed and conducting test designed to meet the program objectives.

Additionally, the JTF is responsible for:

a. Coordinating the participation of all Services and NATO to enable timely completion of the program.

b. Conducting the test to obtain data for analysis and evaluation.

c. Evaluation of test data and preparing test reports.

d. Ensuring timely reports/recommendations are made to DDT&E, the Technical Advisory Board (TAB), and the Senior Advisory Council (SAC).

e. Conducting all training.

f. Preparing inputs to the Five Year Development Plan (FYDP).

g. Reviewing and coordinating test designs.

h. Developing and coordinating test plans and procedures.

i. Providing the testing techniques and the test results to the participating Services and Defense Agencies to aid ongoing acquisition activities in their planning, acquisition, and evaluation of identification systems.

2.1.2.1 Joint Test Director (JTD)

The Joint Test Director is directed under the Charter to:

a. Establish a Headquarters site.

b. Identify and submit to appropriate Service agencies billet requirements for an effective operational and technical staff.

c. Identify related Service test programs, and where feasible, incorporate into this test any pertinent data or results.

d. Develop detailed test plans.

e. Determine resources required to conduct the tests.

f. Undertake necessary actions to obtain required long-lead procurement items required for the test.

g. Conduct the tests; collect, assemble, and evaluate the data.

h. Insure timely transmittal of test data to DDT&E's analytic support activity.

i. Provide the test results and testing techniques to the Army, Navy, and Air Force to aid ongoing acquisition activities in their planning, execution, and evaluation of identification systems.

j. Submit periodic status reports to appropriate agencies.

k. Arrange for disposition of all resources required to conduct the tests.

2.1.2.2 Deputy Test Directors

The individual Service Deputy Test Directors are on site at the IFFN JTF Headquarters, Kirtland Air Force Base. One of their primary responsibilities is to facilitate Service participation in the IFFN JT&E Program. They are assigned to the IFFN JTF and perform the following functions:

a. Represent their respective Service in JTF matters.

b. Advise the JTD on Service problems or changes that could impact joint testing.

c. Make appropriate program and testing recommendations to the JTD, and the respective Service IFFN Program Sponsor.

d. Act as primary liaison between their respective Service and the JTF for test activities.

e. Represent their Service in joint resolution of test issues.

f. Ensure Service technical and operational requirements are provided to the IFFN JT&E Program.

g. Assist in the development, review, coordination and approval of joint program documentation.

STAFF RELATIONSHIPS

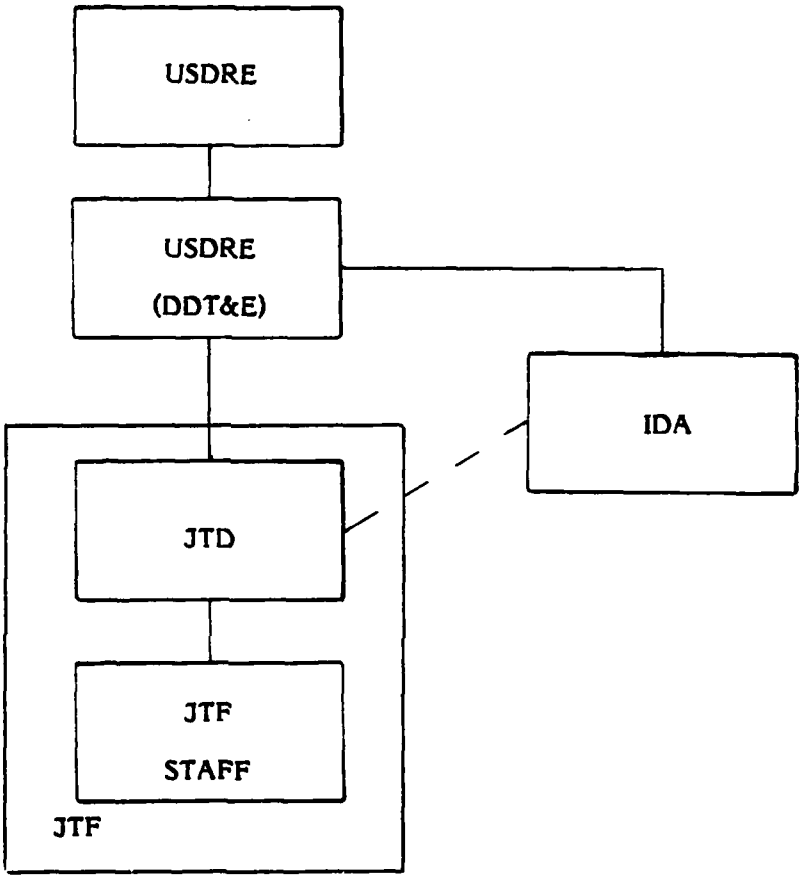


FIGURE 2.1

JTF STAFF

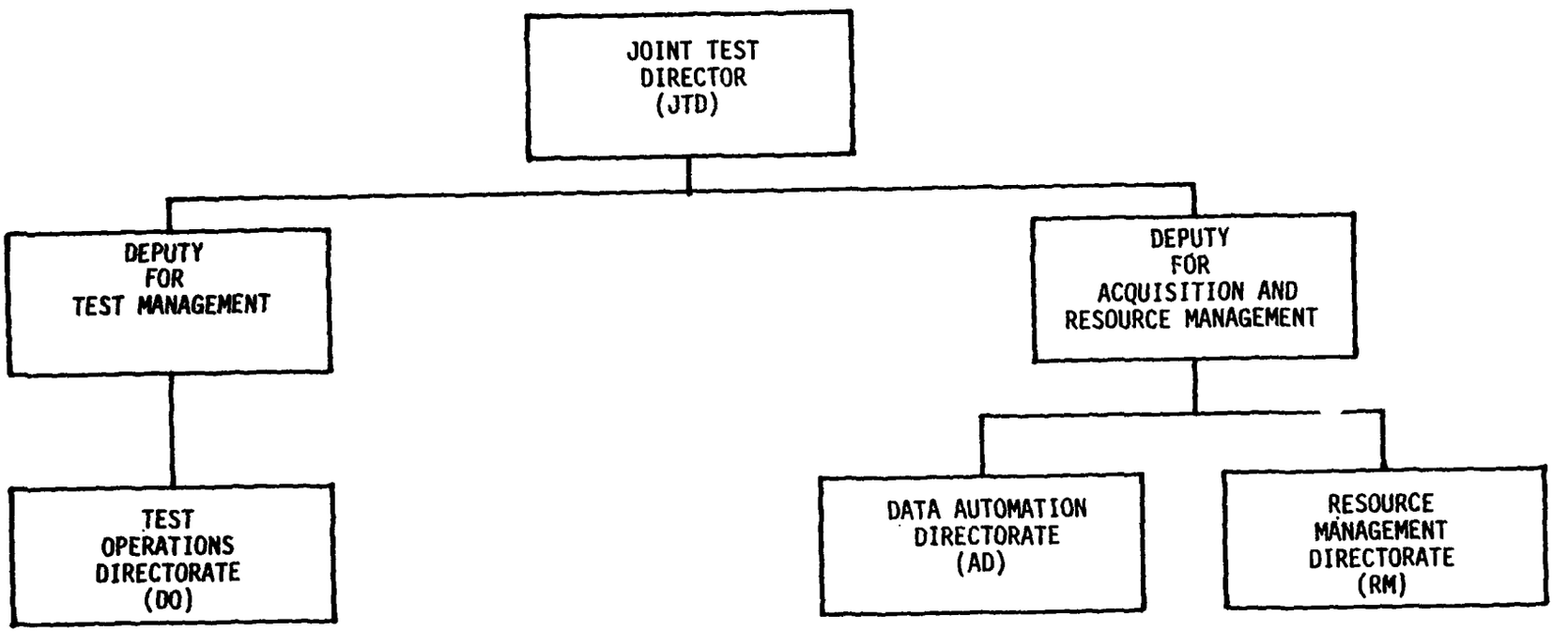


FIGURE 2.2

h. Establish general schedules for all phases of their Service participation, conforming to those established by the JTD.

i. Assist the JTD in those areas concerning their respective Services.

j. Serve as JTF functional managers as specified by the JTD.

2.2 Service Participation

Each individual Service is responsible for the development and implementation of a program plan to support the IFFN JT&E program. For the Air Force this plan is the Test Program Outline (TPO) and for the Army, the Outline Test Plan (OTP). These documents list the personnel and equipment to be provided by the services, based on support requirements specified in this document.

2.2.1 General Responsibilities

Each Service also has general responsibilities including but not limited to:

a. Describing, in general, the system engineering required to modify test facilities/systems to implement the IFFN Test Design.

b. Facilitating the coordination of individual Service LPUs and their preparation for joint testing.

c. Describing, in general, the procedure for certifying the readiness of the individual Service systems and facilities to participate in and support joint testing.

d. Coordinating and reviews of test designs, plans, and procedures.

2.2.2 Air Force Participation. As the Executive Service, the Air Force provides the IFFN JTD with office space and facilities for the JTF located at Kirtland AFB, funding for JTF (Kirtland) office equipment and supplies, and contracting facilities.

As outlined in the TPO the Air Force also provides:

a. Required personnel to staff the JTF and those personnel required to operate the Air Force LPUs.

b. Copier equipment rentals.

c. Communications service to include administrative service at participating Air Force facilities, lease of dedicated computer desk telephone lines, and Cryptographic equipment.

d. Office equipment and supplies at Air Force facilities.

2.2.3 Army Participation. As outlined in the OTP the Army provides:

a. Required personnel to staff the JTF and those personnel required to operate the Army LPUs.

b. Communications service at Ft. Bliss.

c. Office equipment and supplies at Ft. Bliss.

d. Suitable facilities for the IFFN interface equipment at Ft Bliss.

2.3 Institute for Defense Analyses (IDA)

As the principle IFFN evaluation agency for DDT&E, IDA has the responsibility to prepare the IFFN Test Design in coordination with the JTF; assist DDT&E in the review of detailed test plans developed by the JTF; monitor the IFFN tests; and conduct an independent evaluation of the test results.

2.4 IFFN Contractors

2.4.1 Evaluation Testbed System Contractor. The ETS contractor will develop/deliver the hardware and software required to satisfy ETS system specifications. Specifically, the contractor will be responsible for all acceptance test planning, test documentation, test conduct, analysis of results, and test reports necessary to demonstrate to the Government satisfactory achievement of all ETS requirements. It is envisioned that the contractor will establish an internal quality assurance organization to coordinate these responsibilities and to perform all internal acceptance tests and inspections, project reviews, configuration management actions, and record keeping necessary to insure completeness of the delivered product.

The contractor will develop the support programs, documentation, and technical reports on the system and exercise these programs to evaluate the operation of the testbed and to evaluate/analyze the effect on system performance of any modifications or changes to the system.

2.4.2 Technical Support Contractor. The Technical Support contractor will provide technical and analytical support to the JTF in areas related to the ETS implementation (conceptual design through government operational acceptance), testbed operations, and technical/program management training.

2.4.3 Independent Verification and Validation (IV&V) Contractor. The IV&V contractor responsibility is to serve as an independent team which provides the JTF the capability to ensure that the hardware, software, and documentation produced during system development satisfies operational requirements and are consistent with specifications and design documents. The IV&V process will be applied to design reviews, functional and physical audits, and test and evaluation of the software/hardware delivered items.

2.5 NATO Participation

At the present time, NATO responsibilities are not clearly defined. The JTD will make a recommendation through proper channels to facilitate the interface with NATO. This will allow for necessary liaison including:

a. NATO review of documentation such as analysis, design, test plans, and procedures and other publications.

b. NATO recommendation to the JTF.

c. NATO information necessary to the conduct of the IFFN evaluation program.

2.6 Interface With Related Activities and Programs

This section addresses the necessity of establishing a working relationship with the Combat Identification System Program Office (CISPO) and NATO Identification System Program Office (NISPO) to ensure that a coordinated IFFN JTF/CISPO/NISPO approach is addressed.

2.6.1 Combat Identification System Program Office (CISPO)

CISPO is a joint services program office located at Wright-Patterson Air Force Base. It is responsible for combat identification within the U.S. Armed Forces. CISPO is currently developing the Combat Identification System (CIS) and has prepared the Mission Element Need Statement (MENS) which has been approved by OSD/DDR&E C^3I. CISPO also supports the NIS Project Group. A Memorandum of Agreement (MOA) details the relationship between the CISPO and the JTF.

2.6.2 NATO Identification System Program Office (NISPO)

NISPO is a NATO organization in support of NIS Program Group located at NATO HQ, Brussels. It is a technical advisory group with a support function to the NIS Program Group. NIS Program Group is divided into two working groups: Working Group I, Direct Subsystem (DSS) and Working Group 2, Indirect Subsystem (ISS). CISPO supports both Working Groups 1 and 2.

2.6.3 Other Related Programs

The IFFN JTF will conduct frequent liaison with other related programs to ensure maximum input of latest information into test planning and conduct and to ensure efficiency of operation within DOD with a view toward reducing duplicative effort and utilizing common resources where applicable. Of particular interest are the JINTACCS, TACS/TADS, and JFAAD programs.

2.6.3.1 Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

The JINTACCS program is an outgrowth of previous joint interface programs (including TACS/TADS). The program is concerned solely with the exchange of digital data via TADIL-A (Link-11), TADIL-B and TADIL-C (Link 4A) communication links. The program is designed to improve the interoperability of command and control among all branches of the Armed Services.

2.6.3.2 Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS)

TACS/TADS is a distributed testbed for testing command and control systems for joint service use. It is used for testing, recertification, reverification

and validation, and requalification of tactical data links. The testbed is still in use and is scheduled for use within the JINTACCS program in the future.

2.6.3.3 Joint Forward Area Air Defense (JFAAD)

JFAAD is an OSD sponsored Joint Test with the U.S. Army designated as executive service. Although IFFN and JFAAD are focused at different levels, a potential for commonality and overlap exists. An OSD/DDT&E Memorandum dated 1 Nov 83 details the relationship between the two JT&Es. Specifically, JFAAD will examine the scenarios planned for IFFN for possible use and IFFN will examine scenarios and other output from JFAAD to determine usefulness in a timely fashion.

3.0 Documentation

3.1 General. Since the IFFN JT&E program is basically composed of a testbed representing several systems, a central baseline set of documents applicable to all participating systems and organizations is being developed by the IFFN JTF and will be coordinated with the Services/Agencies. The hierarchy of documents related to the program is shown in the Documentation Tree in Figure 3-1.

3.2 Documentation Requirements. In addition to the Program Master Plan (PMP), the following documents are required to fulfill program planning requirements:

a. Feasibility Study: This IDA Study (S-492) defined an IFFN evaluation program that would use alternative test vehicles and provided the basis for the IFFN JT&E program.

b. IFFN Charter: This DDT&E document established the IFFN Joint Test, designated the Air Force as the Executive Service, and outlined the responsibilities of the Joint Test Director and the Services' Deputy Test Directors in accomplishing the test.

c. Concept Definition: This IDA paper (P-1460) proposed an evaluation of the identification function in the context of a mid-intensity, non-nuclear war typical for Central Europe. The paper described the nature of the identification function, program objectives and structure, programmatic issues, a test approach, a review of general technical requirements, candidate architecture, and a strawman testbed concept.

d. Test Directive: This HQ USAF message stated the test purpose, test objectives, evaluation concept and set US Army, US Navy, US Air Force, AFOTEC, Tactical Air Command (TAC) and JTF responsibilities in the conduct of the IFFN JT&E program.

e. Test Concept Paper: This document provides a common view between the JTF and IDA of the overall JT&E while identifying to the "user" community a coherent, self-consistent JT&E. It also provides a foundation for acquisition and simulation decisions and trade-offs necessary for test design and testbed development.

f. Test Operations Requirements Document: This document will be produced by the IFFN JTF and defines the mission and operational requirements, drives system acquisition to satify user needs, and drives training and procedures to satisfy user requirements.

g. Test Design: The Test Design is an IDA product provided for use by the JTF in developing detailed test plans and conducting the IFFN tests. The design will outline the overall test objectives, describe the experimental design, and define requirements necessary to meet the test objectives and carry out the experimental design.

h. Certification Plan: This plan details the procedures to be used in the certification of the testbed. It outlines the Services' responsibilities in the certification effort. It will be produced by the JTF.

i. Field Test Plans: These documents contain the test objectives, test responsibilities, and related factors applicable to each participant in the IFFN Joint Test. This plan translates the test concept and test design into "real-world" resources, procedures, and responsibilities. Detailed data anaylsis evaluation and management plans will be included. They will be produced by the JTF.

j. Software Management Plan: This JTF plan establishes design, performance, and test methodology for software programs supporting the IFFN JT&E program.

k. User's Requirements for Models: These requirements feed through the Model Committee to Logicon and are then fed into their Model Requirements document to meet operational requirements. The Model Committee's function is to advise the JTF on models and to determine if Logicon designs meet operational needs. The model development process is explained in Appendix H.

l. Configuration Management Plan: This JTF plan establishes the concepts and responsibilities for configuration management of the IFFN JT&E program.

m. Data Management Plan: This JTF plan describes the requirements, responsibilities, and procedures necessary to exercise data management for the IFFN JT&E. This plan addresses the control of data from the establishment of requirements through test reporting.

n. Training Plan: There are two types of Training Plans. One plan sets forth the methods and responsibilities for training personnel in the operation of the equipment of the ETS and is the responsibility of the ETS contractor. The other is for training personnel operating Manned Simulating Participating Units (MSPUs), Test Control Monitors (TCMs), etc, in necessary tactics and will be produced by the JTF. The Training Coordinator insures the necessary training is planned for and accomplished.

o. Acceptance Test Plan: This JTF plan sets out the method, schedule, and benchmarks to be used in the formal acceptance of the ETS, including hardware, functional (software), and system acceptance testing.

IFFN DOCUMENTATION TREE

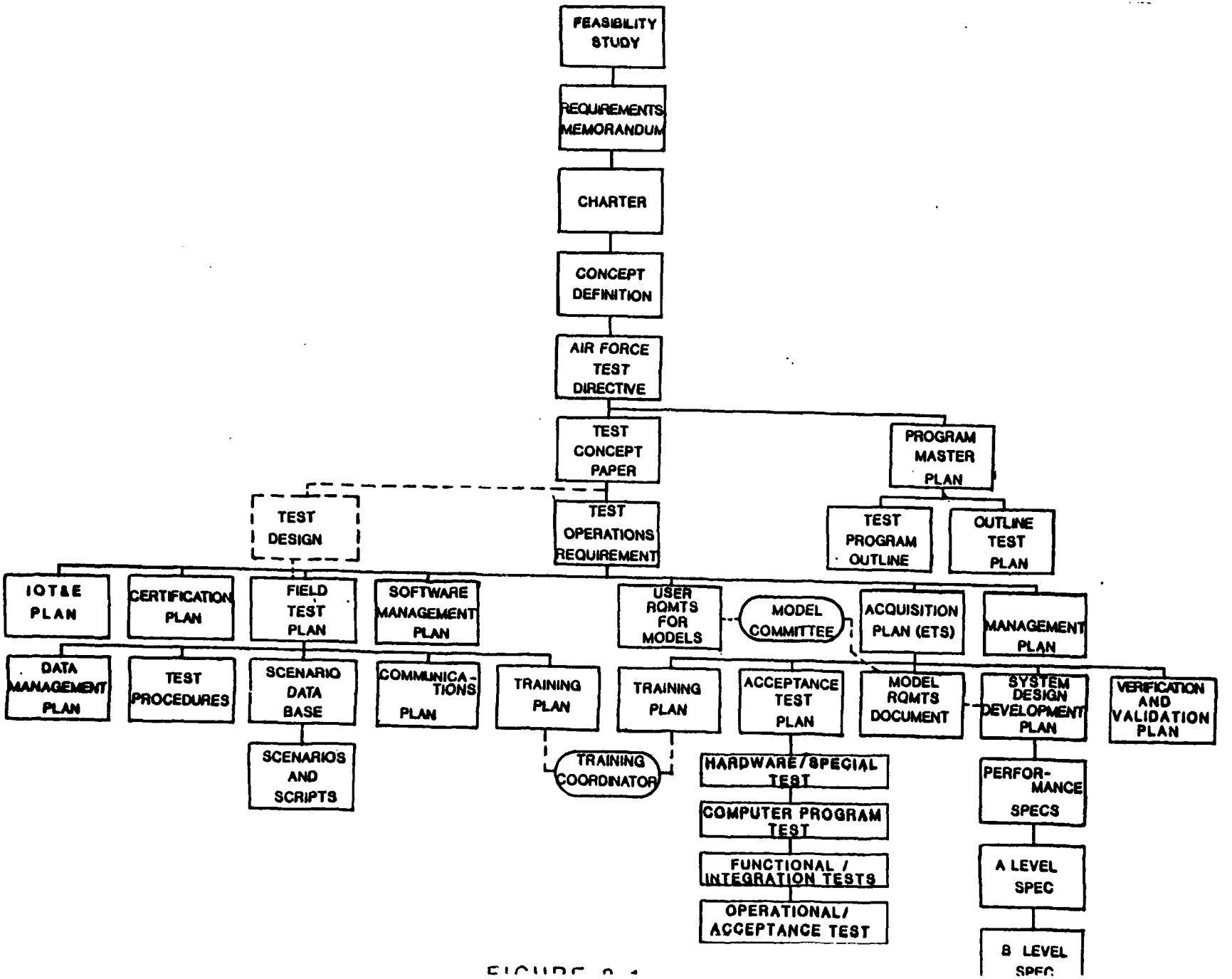


FIGURE 2-1

4.0 System Engineering

4.1 General

Adequate system engineering is required for the implementation of the IFFN Testbed. It is concerned with achieving improved procedures and equipment in the air identification process in Service , Joint, and NATO operations.

4.2 Developmental Implementation

The purpose of the IFFN JT&E program is to assess baseline US capabilities within the NATO air defense command and control system to perform the IFFN function; identify deficiencies in the performance of that function, and propose potential near-term procedural and equipment modifications for further testing. This entails facilitating or improving the flow of information between LPUs of the participating Services and/or their supporting tactical data systems. The information exchange will take place across interfaces that are either manual (man-to-man), semi-automated (man-to-computer), or automated (computer-to-computer).

4.3 Facilities and Systems

An analysis is required to determine the facilities required to support joint testing and provide connectivity between the LPUs/Systems, the CSF at Kirtland AFB, and the communications and data link network/equipments which will connect them. This analysis is being conducted by the JTF.

4.4 LPU Engineering

An engineering survey will be conducted to determine which current configurations and capabilities are applicable to the IFFN program. The configuration of the designated LPUs will be determined. A comparison of the LPUs with existing platforms and operational equipment will be made to identify any LPU unique equipment requirements. Maximum utilization of existing equipment is planned.

Close coordination with the Services will be required to determine the extent of the interface between the CSF and the service LPU. This is necessary to identify interface requirements and specifications IFFN provided equipment must meet to effectively interconnect service LPUs into the Evaluation Testbed System. A recommendation will be made for the location of the IFFN JTF provided equipment.

5.0 Test Concept of Operations

5.1 Test Execution

5.1.1 Concept of Operations for Test Execution. The conduct of the IFFN JT&E will be performed on the IFFN Evaluation Testbed System which is defined in Federal Contract No. F29601-81-C-0055, Evaluation Testbed Specification Portion, Feb 1981.

There is no requirement for live operation of aircraft, live fire of weapons, live operation of radars, or field deployment of weapons and command and control systems planned for representation in the testbed. The IFFN ETS is a distributed testbed consisting of a Central Simulation Facility at Kirtland AFB, test subjects (for the purpose of this document, test subjects are synonymous with LPUs) at locations identified in Section 1 of this document, and the associated communications necessary to connect the CSF with the appropriate remote test subjects.

5.1.2 ETS Concept of Operations. The ETS concept to support test execution is for the CSF to execute and distribute a programmed air scenario to test subjects in real time personnel manning the LPUs interact with the scenario. The CSF will also record all data which can be collected digitally. Data which cannot be collected digitally will be collected by IFFN JTF observers at each remote LPU location. Voice communications will be recorded both at the CSF and at remote LPU locations.

5.1.3 Test Execution Organization. Test execution is organized into seven series of testing. Series 1 tests the identification performance of a representative US Army Surface-to-Air Missile (SAM) System (a PATRIOT Fire Unit). Series 2 adds the PATRIOT's first echelon of command and control, the Battalion Fire Direction Center. Series 3 adds the next level of command and control, the Brigade Fire Direction Center. Series 4 tests US Air Force fighter-interceptors (F-15) alone. Series 5 adds associated USAF command and control nodes and information sources. Series 6 will integrate the Army systems from Series 1-3 with the USAF systems from Series 4 and 5 together for joint operations. Series 7 will add a CRC to form the full up system to be tested. For complete detail and discussion on the test series breakout, refer to the IFFN Test Concept Paper. See Appendix B for the test series schedule.

The strategy for a phased test schedule is twofold. To accomplish the first test concept issue, echelons of command and control in an integrated air defense system will be added and assessed for their relative contribution to the identification performance of the air defense weapons system. Equally important is test schedule integration with the ETS acquisition schedule and the availability of Service-provided test subjects. The current test schedule balances acquisition costs and simulation development risk against the need for early, reportable results.

The general location chosen for the test subjects is the battle management area of a representative NATO CRC located in the 4ATAF area. The scenario is a full-scale, theater conventional war involving Warsaw Pact and NATO forces based upon a projected 1987 threat.

NATO forces will be projected on a selected baseline in the 1985-1986 timeframe for capability and orders of battle and updated as the scenario year coincides with the test year.

The opposing Warsaw Pact forces will also be projected based upon a 1987 threat.

5.1.4 Representation of Test Subjects. Test subjects will be represented by LPUs which are either the actual operational system or a Service-approved, simulator/simulation with comparable capabilities. Critical to test subject

representation is the operator as an integral part of the identification process. In all cases LPUs will be stimulated from the CSF and measured at the CSF and their location. Specific test subjects are identified in the IFFN Test Concept documentation.

5.2 Test Operations Resource Requirements. The primary resources required to accomplish the IFFN JT&E are facilities, equipment, and personnel. Facility resources are those structures that provide shelter for service/contractor provided test equipment, IFFN interface equipment, and office space for IFFN personnel. Test equipment resources are those sets of hardware needed to effectively pursue the IFFN JT&E. These suites of equipment are designated as either Service-owned equipment or IFFN interface equipment. Service-owned equipment are those sets of hardware, either actual or surrogate, that accurately replicate the functions of command and control/weapons systems in an operational environment. IFFN interface equipment will be capable of providing a realistic air war environment by appropriate stimulation of the test subject hardware. Finally, IFFN JT&E personnel requirements include test subject operators and IFFN assigned test control monitors. Test subject operators are operational command and control/weapons systems personnel who will be operating the tactical equipment during IFFN JT&E testing. IFFN assigned test control monitors are those individuals assigned to the JTF required to carry out the objectives of the IFFN program.

5.3 Personnel Training. The IFFN training program will familiarize test personnel with hardware/software functions, test configuration procedures, and NATO tactics to be used during test operations. There are four basic blocks of training required for IFFN test personnel:

(1) System checkout and systems operations will cover the equipment/systems to be used, its associated setup procedures, and system hardware/software operations. This training for CSF and Detachment personnel will be initially performed by the primary system development contractor while initial system training for LPU crews will be accomplished by each Service prior to release of these individuals to support test operations.

(2) Test configuration procedures will train test personnel in those procedures used to configure the system for test peculiar requirements.

(3) NATO tactics training will familiarize test personnel in those NATO tactics and procedures necessary to respond to the IFFN testbed as they would to the actual real world system. This training will be conducted by IFFN LPU Detachment instructors and selected IFFN CSF instructors.

(4) Continuation/upgrade training will involve increasing and maintaining CSF/LPU operator system proficiency in using the system/equipment, and for presenting any changes or enhancements to the system/equipment. This training will be conducted by JTF instructors. The method for accomplishing the above training is through classroom academics and "hands-on" positional system operations practice. Classroom presentations will be lectures, briefings, and self study enhanced by viewgraphs, slides, workbooks, and resource documents. Positional practice will use the system consoles at the CSF and LPUs to reinforce classroom presentations and allow for proficiency practice at all positions through simulation.

6.0 Resource Requirements

6.1 Personnel

6.1.1 Military Personnel. The personnel requirements for the conduct of the IFFN JT&E fall into several categories. Listed below are the total number required from the Services for the manning of the JTF. A breakout of dates and specialties required is located in Appendix F.

JTF Staff

	Officers	Enlisted	Civilian	TOTAL
Air Force	31	21	15	67
Army	25	18	1	44
Other	-	12	-	12
TOTAL	56	51	16	123

LPU operator and maintenance personnel requirements vary with each LPU. A breakout of personnel required is located in Appendix F.

Other military personnel necessary to the program include those individuals from military laboratories and other military activities that provide ad hoc assistance to the JTF.

6.1.2 Civilian Personnel. Civilian personnel requirement fall into two categories: civil service and contractor personnel.

Civil service personnel requirements are found in Appendix F as part of the manning requirement for the JTF.

Contractor personnel are those personnel working for the ETS contractor, Independent Verification and Validation (IV&V) contractor, or Technical Support contractor on the IFFN JT&E. These manning requirements vary with each contract and are specified in each contract.

6.2 Equipment and Facilities. There is a requirement for a number of special contracts and host/tenant agreements necessary to the completion of the JT&E program.

6.2.1 Host/Tenant Agreements. Host/tenant agreements with the following government activities housing LPUs will be required:

Ft. Bliss, TX (PATRIOT FU and FDCs)

Hurlburt Fld, FL (407L CRP)

Avionics Integration Laboratory, Seattle, WA (NE-3A)

As a minimum, these agreements will address the nature and structure of the IFFN JT&E program and the administrative chain of command. The

schedule for testing in relation to the use of system/personnel at the various sites and the following will be addressed:

a. Responsibility for funding

b. Procedures for reimbursement of funds (where applicable)

c. Logistic support procedures for the SSUs located at the LPU sites

d. Security requirements

e. Personnel facility requirements for ETS, test program, and associated observers, etc.

f. Office/maintenance space requirements.

g. Definition of points of contact for coordination and resolution of problems

h. COMSEC storage/maintenance requirements

6.3 Funding. The funding for the IFFN Evaluation Program will be provided in accordance with Chapter 251 of the DoD Budget Guidance Manual 7110-1-M, and applicable service directives. For JT&E testing, the individual services are reimbursed from the defense appropriation for joint testing (P.E. 65804D). The funding profile for the program is described in Appendix C. Individual Service funding requirements/plans will be contained in the respective service program plans. Basically, these plans deal with funding requirements through FY 88 and should include:

- o Program Management
- o JTF Support
- o System Engineering/Analysis
- o Test and Evaluation
- o Facility Engineering
- o Training of Personnel
- o Preparation of unique plans for the LPUs as appropriate to include LPU certification
- o Model Committee participation

They should also present a man-year summary of requirements through FY 88.

In order to properly formulate and execute the budget, the JTD formally established the Financial Working Group (FWG) to review all facets of the budget in order to insure the most effective allocation of available financial resources. The FWG is chaired by the Director, Resource Management, and is composed of the

Director of Data Automation, Director of Test Operations, Comptroller and other members as determined by the JTD. The primary purpose of the FWG is to establish a forum in which IFFN program financial requirements are initiated, evaluated and reviewed on a continuing basis. This forum allows for input from the three Directorates on such matters as the Evaluation Testbed System and associated contract requirements, JTF travel requirements, and supply/equipment requirements. It provides for the coordination of initiatives from within the JTF as they relate to the financial profile of the program. Other purposes for which the FWG was established will be to evaluate obligations versus budget estimates and prepare recommended budget submissions/revisions for approval by the JTD. The FWG will meet at the discretion of the Chairman.

The Joint Test Force's budgeting process consists of two distinct stages; formulation and execution. Although distinct and separate because they involve different years, the two stages run concurrently.

Budget formulation begins each year with the April meeting of the FWG. The budgets under consideration are for the Budget Year and the Program Year. The FWG is concerned with finalizing requirements for the Budget Year and coordinating requirements for the Program Year. FWG will meet as necessary during the months of April and May in order to assemble a recommended budget submission for the JTD's approval and transmittal to OSD. The budget submission will be submitted to OSD during the first week in June for incorporation into the OSD budget. Budget formulation continues even after the formal submission to OSD. The Budget Year and Program Year budgets are constantly refined until such time as the Budget Year becomes the Current Year and Program Year becomes the Budget Year.

7.0 Testbed Acquisition

7.1 Overview of Testbed Acquisition

7.1.1 Acquisition Program. The overall JTF acquisition program consists of the design, development, installation, acceptance, operation, and maintenance of an Evaluation Testbed System (ETS). To meet IFFN test objectives, the ETS must be capable of:

a. Generating off-line and representing in real-time operationally realistic scenarios for the identification of airborne targets in wartime environments.

b. Representing selected air defense systems in various tactical configurations that interact dynamically within the real-time scenario.

c. Collecting identification-related measurements during the course of testing.

d. Centralized control and monitoring during all test operations.

e. Extraction, reduction, and analysis of data collected during test operations.

7.1.2 Acquisition Issues. Many of the issues associated with the acquisition of the IFFN Testbed are documented in the Institute for Defense Analyses' Paper P-1460, "IFFN Evaluation Program", dated August 1979. Specific issues addressed and documented in that paper include:

a. The location of the JTF and Central Simulation Facility (Kirtland AFB, NM)

b. Testbed Architecture

c. Conceptual design of the computer system (hardware and software)

d. Location of live participating units

e. Scope (area of interest, type of participating units, number of aircraft)

f. Realism and fidelity requirements

g. Distributed processing/hybrid facility concepts

h. Man-in-the-loop requirements

i. Types and quantity of models

j. Incremental development

k. Flexibility and modifiability requirements

l. Scenario requirements

m. Test Issues

n. Risk analysis

o. Contracting strategy for system design

7.2 Testbed Design Concept

7.2.1 Function. The function of the ETS is to provide a vehicle to assess baseline US capabilities within the NATO air defense command and control system to perform the IFFN function, identify deficiencies in the performance of that function, and propose potential near-term procedural and equipment modifications for further testing.

7.2.2 Testbed Architecture. The ETS is a centrally-controlled geographically distributed computer network that consists of three functional subsystems.

7.2.2.1 Central Simulation System/Support Data Processing (CSS/SDP). This subsystem consists of a suite of seven mini-computers, six array processors, and related peripherals physically located in the Central Simulation Facility at Kirtland AFB, New Mexico. The principle means of interaction is through dedicated multiported shared memory and high speed buses. The CSF equipment can operate in either of two modes: as a Central Simulation System for real time test operations or as a Support Data Processing facility for pretest operations, posttest operations, program maintenance, and diagnostic processing.

7.2.2.2 Satellite Simulation Subsystem (SSS). This subsystem consists of geographically remote mini-computers and related peripherals each co-located with either an actual operational air defense system or a suitable surrogate (e.g. operational simulator). These Satellite Simulation Units (SSU) interface the live operational system with the Central Simulation System by providing the stimulation required to operate the air defense system in a simulated environment without alteration to the actual equipment.

7.2.2.3 ETS Communications Subsystem (ECS). This subsystem interconnects the CSS and the SSS through leased landlines and provides the telecommunications capability to distribute coherent air truth to all test nodes, permit operational voice and data link communications, collect remotely recorded data, and monitor and control test execution.

7.2.3 ETS Software Subsystems. The major IFFN software subsystems include support/diagnostics, pretest scenario development, posttest reduction and analysis, and realtime test.

7.2.3.1 Support/Diagnostics. This subsystem consists of one Computer Program Configuration Item (CPCI), the Support, Utilities and Diagnostics CPCI, which provides CSF and SSU software utilities to assist in the operation of their respective computers, CSF and SSU support software to aid in software development, and CSF and SSU diagnostic software designed to diagnose the operational integrity of CSF and SSU hardware. The system/support software will consist primarily of off-the-shelf software as supplied by the various vendors. Most of the diagnostics will be developed by the prime contractor.

7.2.3.2 Pretest Scenario Development. This subsystem consists of two CPCIs which will allow test planners to construct and maintain data files and scenarios required for conducting IFFN ETS tests.

a. The Scenario Planner CPCI will provide the test planners with a high level scenario planning language and accompanying scenario environment specification tools which will allow rapid and reliable scenario design.

b. The Scenario Planner CPCI will be responsible for translating the output from the Scenario Planner CPCI into the structure and format required by the CSS Real Time Test subsystem.

7.2.3.3 Posttest Analysis and Reduction. This subsystem consists of four CPCIs which support the performance of posttest data evaluation.

a. The Data Collection CPCI provides the means for collecting and consolidating the data recorded during real time and replay.

b. The Data Reduction CPCI provides the means for reducing the collected data to a useful size and format as well as generating the primary trial data bases.

c. The Data Analysis CPCI provides the user with the tools to retrieve data from the data bases and perform analysis of the trial outcome.

d. The Replay CPCI provides the user with the capability to play back a test exercise using previously recorded CSS exercise data as the input.

7.2.3.4 Real Time Test. The Real Time Test Subsystem (RTS) consists of the CSS real time CPCIs executing in the CSF at Kirtland AFB and the Satellite Simulation Unit real time CPCIs executing at the various remote sites. Together they comprise the IFFN Tactical Simulation Program (TSP). The CSS CPCIs are allocated processing on the basis of functional relationships, data relationships, and load balancing across processors.

a. The Master Simulation CPCI is responsible for maintaining control of test progress, synchronizing simulation time with all participating units, maintaining and distributing track truth data to all users.

b. The Display and Control CPCI provides the man/machine interface for test control, test monitoring, site status data monitoring, data link monitoring, data recording, and simulated facility control.

c. The Data Link Simulation CPCI formats/transmits and receives/deformats the data link message stream for each of the data links utilized by the CSS RTS.

d. The Participation Unit Simulation CPCI simulates the detection, tracking, threat evaluation and scheduling, and facility control functions of each simulated facility unit. This CPCI discretely models each simulated unit data link processing as required for IFFN testing.

7.2.4 Documentation. Documentation for the Evaluation Testbed System is based on the identification of formal configuration items (CIs) and the

configuration baseline approach implemented for Configuration Management (CM).

7.2.4.1 Configuration Items (CI). Three configuration items make up the IFFN Evaluation Testbed System: the master CI, system/equipment CIs and computer program CIs.

a. Master CI. The IFFN ETS is considered to be the master system configuration item. It is comprised of all equipment and computer programs necessary to perform the system functions in accordance with the prime contract Statement of Work (SOW). The ETS does not include the Live Participating Units but interfaces and interacts with them to accomplish IFFN Joint Test Program objectives.

b. System/Equipment CIs. The system/equipment CIs correspond to the equipment and computer programs associated with each of the three subsystems described in paragraph 7.2.2 above i.e. the CSS/SDP, the SSS, and the ECS.

c. Computer Program CIs (CPCIs). The Computer Program CIs correspond to the CPCIs that comprise each of the five functional software subsystems described in paragraph 7.2.3 above.

7.2.4.2 Baselines. The establishment of baselines provides for an orderly, controlled transition from one step of development to the next. Baselines are defined by formally designated sets of approved technical documentation that specify testbed design and performance requirements and serve as points of departure for subsequent hardware/software development. The establishment of each baseline is preceded by the development of specific documentation, a formal review/audit of this documentatin, and the systematic alteration (change control) of any previously approved documents or any portion of the documents currently under review.

7.2.4.3 Baseline Descriptions. Three baselines are identified: Functional, Allocated, and Product. These baselines refer to selected, approved documentation describing configuration identification at various points in the program in accordance with standard military configuration management methodology and the IFFN JTF testbed configuration management concepts.

7.2.4.3.1 Functional Baseline (FBL). The Functional Baseline is a set of basic design documentation which receives JTF approval as a result of formal Preliminary Design Review (PDR). Included are the following documents:

a. Initial System Specification (Type A)

b. Prime Item Development Specifications (Type B1)

c. Computer System Specifications

d. User Language Specification

e. Data Requirements Document

7.2.4.3.2 Allocated Baseline (ABL). The Allocated Baseline is a set of design documentation which receives JTF approval as a result of formal Critical

Design Review (CDR) and a Design Configuration Audit (DCA). In addition to the Functional Baseline, the documents included in the Allocated Baseline are:

a. Interface Design Specifications

b. Interface Control Document

c. Program Performance Specifications

d. Program Design Specifications

e. Common Data Base Design Document

f. Disk Data Base Design Document

g. C level Specifications (for developmental hardware items)

7.2.4.3.3 Product Baseline (PBL). The Product Baseline is a set of documentation which receives JTF approval as a result of Functional Testing, Integration Testing, the Functional Configuration Audit (FCA), Operational Acceptance Testing and the Product Configuration Audit (PCA). In addition, documents included in the Product Baseline are:

a. System Operator's Manual

b. Engineering Drawings

c. C level Specifications

d. Program Description Documents

e. Program Package Documents

7.3 Testbed Aquisition Strategy

7.3.1 Acquisition Strategy. The JTF acquisition strategy is based on a three phased, cost plus award fee contract for the design, development, installation, test, and support of the hardware and software that will comprise the IFFN Evaluation Testbed System. The contract strategy includes an award for Phase I, exercise of an option for Phase II, and the addition of Phase III pursuant to a supplemental agreement at some future date of the contract effort.

a. In Phase I (Design) the contractor will generate MIL-STD-490 type B1 and C1a specifications based on the contract Statement of Work (SOW) and the government furnished IFFN Evaluation Testbed System Specifications. The contractor will undergo a Preliminary System Design Evaluation (PSDE) and a Final System Design Evaluation (FSDE). The end result of Phase I will be an established functional baseline design of the IFFN Evaluation Testbed System. The objective of Phase I is to have the inherent risks (technical, cost, and schedule) and the possible trade-offs analyzed and refined prior to selection of a testbed design concept to achieve the overall program technical objectives.

b. Upon favorable IFFN JTF evaluation of the contractor's design at FSDE, the option for Phase II will be exercised. Phase II will consist of the

detailed design, development, installation, integration, and test of the initial testbed system. Phase II will be divided into three overlapping stages (1-3) each of which incrementally implements additional system capabilities to permit execution of the progressive testing concept described in paragraph 5.1.3, Test Execution Organization. During each stage, the contractor will update the Type B1 and C1a specifications developed during Phase I as well as generate Type B5 and C5 specifications. The updated and new specifications will be reviewed at a Preliminary Design Review (PDR) and approved at a Critical Design Review (CDR) for each stage. This activity will insure that the contractor integrates the various functional subsystems to meet the testbed's technical objectives and documents and changes/upgrades/modifications to maintain configuration control. As such, an allocated baseline can be established and maintained as each stage undergoes development. At each stage, several fundamental events take place including:

(1) Hardware acquisition and installation

(2) Software development which includes

(a) Scenario development and stimulation

(b) Simulation of new air defense test elements

(c) Data extraction/reduction/correlation

(3) Software enhancement to upgrade previously developed simulations and testbed capabilities.

(4) Integration and checkout of Live Participating Unit(s) associated with the stage.

The end result of Phase II will be an operational testbed system capable of supporting the first four test series depicted in Appendix B. Appendix D shows the schedule and composition for each stage of Phase II.

c. Phase III, if added, will consist of two stages (4-5) and will entail upgrading the Phase II Testbed to incorporate additional LPU capabilities. The same activities accomplished during the Phase II stages will be required for each stage in Phase III. The end result of Phase III will be a Testbed system capable of replicating all the essential elements of the NATO air defense command and control system described in paragraph 5.0, Test Concept of Operations. See Appendix D for the schedule and composition for each stage of Phase III.

7.3.2 Contract Type. A Cost Plus Award Fee (CPAF) completion contract is contemplated for all phases. A cost reimbursement arrangement is necessary based on the high technical, cost, and schedule risks involved with the successful completion of the program requirement. In addition, the stated risks could negate the effect of established performance, schedule, and cost incentives. For this reason, an award fee arrangement is suited to the proposed acquisition and will provide greater incentive than any other fee arrangement. Award fee criteria will be established and monitored by technical and contracts personnel.

7.3.3 Independent Verification and Validation Contract. As part of the JTF's acquisition strategy, an IV&V contractor will be obtained to provide the JTF with an organization independent of the prime ETS contractor. Their primary

responsibility will be to ensure that the ETS meets the government's specifications and operational requirements. The contract effort will consist of a contractor performing IV&V activities during the acquisition design, development, and installation, and test phases of the IFFN Testbed. The process will consist of design reviews, functional/physical audits, and test and evaluation of the software/hardware delivered items.

7.3.4 Technical Support Contract. The complexity of the ETS system requires a continuous effort to ensure that all system requirements are identified, developed, and successfully integrated into the program. A separate Technical Support contract will be issued to support the JTF staff in this effort. The objective of the Technical Support contract is to provide technical and analytical efforts in support of the design, implementation, and operation of the ETS. Some of these subtasks are Test Plan Development, Scenario Development, Testbed Implementation Support, Testbed Operations Support, ETS Management and Control, and Training.

7.4 Testbed Acquisition Management.

7.4.1 Objectives. The primary objectives of the JTF acquisition management approach are to:

a. Ensure that a test vehicle capable of satisfying IFFN program objectives is developed.

b. Assure product quality is built into the ETS.

c. Reduce risks (technical, cost, schedule) to an acceptable level.

d. Control changes that may impact the acquisition.

e. Insure satisfactory contractor performance is obtained.

7.4.2 Acquisition Responsibility.

7.4.2.1 Program Manager (PM). Overall management and conduct of the IFFN acquisition program is the responsibility of a Program Manager (PM) appointed by the JTD. The PM is principally responsible for managing all aspects of the IFFN ETS contract including program, technical, and administrative management. The PM interfaces with the prime contractor's program manager on all management issues (e.g. contract scope, schedule, cost, resources, etc.) that may affect the acquisition. The JTD, however, is the sole individual authorized to give program direction and approve contract changes. The PM is the focal point for all activities relating to the ETS acquisition. He coordinates with the appropriate Service Deputies on action items requiring specific service support and interfaces with IV&V and Tech Support contractor program managers as required. The PM's staff consists of JTF functional specialists needed for program execution and forms an essentially self-contained organization. These positions will be described in the following paragraphs.

7.4.2.2 Deputy Program Manager (DPM). The Deputy Program Manager is responsible for supervising and coordinating the activities of the PM's staff. He is responsible for the day-to-day coordination of all contract activities. He assists the PM in planning, executing, and monitoring all aspects of the ETS contract in

particular and the acquisition program in general. He acts for the PM in his absence. In addition, the DPM functions as the ETS System Engineer and is responsible for insuring the technical and engineering integrity of the ETS including compatibility of actual tactical hardware or operational simulators interfaced into the ETS. As System Engineer, the DPM directly supervises JTF Technical Representatives to the Contracting Officers (TRCOs).

7.4.2.3 Technical Representative to the Contracting Officer (TRCO). A TRCO is the PM's principal liaison officer with a specific contractor's program manager on all technical issues and is the only authorized JTF personnel to issue, with PM and/or JTD approval, technical direction to the contractor. The TRCO will monitor and control all contact that may be necessary between JTF functional area technical experts and the contractor. TRCOs directly responsible to the JTF PM are the ETS and IV&V contract TRCOs and TRCOs to be appointed for each system specific LPU acquisition. The TRCOs responsibilities include: coordinating contractor/JTF activities on technical issues; conducting technical interchanges with the contractor; process/track/control technical action items resulting from interchanges, meetings, formal/informal reviews and change requests; coordinate/interface with other TRCOs and contract management personnel; monitor contractor performance; and maintain an accurate acquisition schedule of events for input into the overall JTF program schedule.

7.4.2.4 Contracting Officer Representative (COR). The COR is the individual assigned as the IFFN business manager for JTF contracts and is directly responsible to the Director, Resource Management. However, he is one of the principal liaison officers with contract program managers and advises the JTF's PM on all pertinent contract matters. The duties of the COR include interfacing with the Kirtland Contracting Office, verifying compliance with contractual requirements, assisting TRCOs in determining technical, schedule, and cost impacts of any changes to the scope, level of effort, total cost and period of performance of the contract, and monitoring the financial status of the contract.

7.4.2.5 JTF In-Plant Representative (Detachment 8). The in-plant representative serves as the ETS TRCO's assistant and on-site coordinator with the prime ETS contractor. He monitors contractor progress/attitudes, participates in contractor development efforts on a non-interference basis, facilitates JTF directions/redirections from the ETS TRCO, and reports on contractor problems and progress. The in-plant representative maintains close coordination with the ETS TRCO and the COR to insure complete understanding of JTD and PM policies and guidance.

7.4.2.6 Acquisition Management Division. The Acquisition Management Division is directly responsible to the PM for the administrative management of each acquisition stage's life cycle and for implementing JTF Quality Assurance and Configuration Management procedures in support of the overall ETS acquisition effort.

7.4.2.6.1 Stage Managers. Stage Managers are directly responsible for all administrative matters pertaining to the acquisition stage to which assigned. They are responsible for planning, coordinating, scheduling, monitoring, and reporting on all acquisition milestones associated with a stage, such as formal reviews, tests, audits, and deliveries. The Stage Manager coordinates closely with the ETS TRCO, the COR, other Stage Managers, other TRCOs (e.g. IV&V), and JTF functional area experts to insure all stage contractual requirements are satisfied.

7.4.2.6.2 Quality Assurance (QA). JTF Quality Assurance personnel are responsible for insuring that JTF QA procedures are properly administered and implemented both within the JTF and by the ETS contractor. They work in close coordination with the IV&V TRCO during design reviews, audits, and test and evaluation of software/hardware delivered items to ensure that the ETS meets the government's specifications and operational requirements.

7.4.2.6.3 Configuration Management (CM). JTF Configuration Management personnel are responsible for insuring that JTF CM plans and procedures are properly administered and implemented both within the JTF and by the ETS contractor. Of primary importance is to insure that the integrity of baseline ETS configuration identification is maintained and that changes to the baseline are strictly controlled and processed in accordance with established CM procedures.

7.4.2.7 Functional Area Experts. Functional Area Experts are JTF personnel who are specialists responsible for reviewing, monitoring, and evaluating the design and development of an assigned functional area of the ETS. They are augmented when possible by JTF personnel in other directorates and selected experts from Service and civilian agencies to insure that JTF requirements and specifications are contained in the ETS contractor's products. The Functional Area Experts facilitate responsive and open communications between the JTF and the ETS contractor and closely coordinate their activities with the ETS TRCO and Stage Managers. They also insure that areas that affect offices of collateral responsibility are coordinated with and kept informed.

8.0 Testbed Certification

8.1 General. As defined in this testbed, certification is a function designed to assure the fidelity of the testbed. This function will ensure that the testbed, or a portion thereof, is an adequate representation of the real-world system that is being simulated.

8.2 Approach. The general approach chosen to certify the testbed is to compare testbed operations with live operations under identical conditions (scenarios). Live operations data will be collected from exercises conducted for system evaluations and/or training purposes. The testbed would be set up to simulate the situations observed in the exercise, i.e., same background, environment, systems configuration, and rules of engagement.

Comparisons of the field exercises and corresponding testbed operation will be performed at three levels.

a. Opinions of experienced air defense operators as to the realism of the testbed and the results.

b. Comparison of the identification and engagement statistics, as defined by the test measures of effectiveness.

c. Comparison of time of occurence of major track events; i.e., detection, identification, and engagement.

The prime contractor will develop an Operational Acceptance Test (OAT) Plan for each stage which will incorporate JTF-developed scenarios that will satisfy portions of the certification requirements.

The JTF will conduct an Initial Operational Test and Evaluation (IOT&E). This effort will support certification in those areas not covered during OAT.

It is hoped that through this process the Services, as the ultimate users of the testbed data, will receive the best assurance that they are getting a substantive product.

Further discussion of the certification process can be found in the Certification Design to be produced by IDA and the Certification Plan to be produced by the JTF.

William R. Davis

WILLIAM R. DAVIS, COL, USAF
Joint Test Director

APPENDIX A

REFERENCES

Though each listed reference may not be mentioned specifically in the text of this document, each does contribute to some facet of the Program Master Plan and will provide excellent information for IFFN Program personnel.

a. DoD Directive 5000.1 Major System Acquisitions

b. DoD Directive 5000.2 Major System Acquisition Process

c. DoD Directive 5000.3 Test and Evaluation

d. DoD Joint Test and Evaluation Procedures Manual

e. OUSD Memorandum; Subject: Joint Test - Identification Friend, Foe, or Neutral (IFFN) dated 23 March 1979.

f. OUSDRE/DDTE Memorandum; Subject: Joint Test - Identification Friend, Foe, or Neutral (IFFN) dated 26 June 1978.

g. OUSDRE (T&E) Memorandum; Subject: Joint Operational Test Funding Policy, dated 11 February 1974.

h. OUSDRE Memorandum; Subject: IFF Development Program dated 19 January 1979.

i. DoD Memorandum of Agreement on Multiservice OT&E and Joint T&E dated 27 March 1979.

j. DDT&E Charter for Test Director of Joint Test Identification Friend, Foe, or Neutral (IFFN) dated 12 July 1979.

k. HQ USAF Message, P162030, July 1980; Subject: Test Directive for the Identification Friend, Foe, or Neutral (IFFN) Joint Test and Evaluation (JT&E).

l. IFFN Master Schedule

APPENDIX B

SEQUENCE OF TEST SERIES

Test Series	Configuration	Test Dates	Live Participating Units	Simulated Participating Units	Communication Links
1	6	Jul 85-Aug 85	PATRIOT FU		PADIL
2	5	Oct 85-Nov 85	PATRIOT FU PATRIOT Bn FDC	PATRIOT FU	PADIL
3	4	Jan 86-Mar 86	PATRIOT FU PATRIOT Bn FDC PATRIOT BDE FDC	PATRIOT FU PATRIOT Bn FDC	PADIL ATDL-1
4	7	Jun 86-Jul 86	F-15		
5	3	Jan 87-Mar 87	F-15 CRP NE-3A	F-15 SIS	TADIL-A TADIL-B
6	2	Apr 87-Aug 87	PATRIOT FU PATRIOT Bn FDC PATRIOT Bde FDC F-15 NE-3A CRP	PATRIOT FU PATRIOT Bn FDC F-15 SIS	PADIL ATDL-1 TADIL-A TADIL-B
7	1	Sep 87-Dec 87	PATRIOT FU PATRIOT Bn FDC PATRIOT Bde FDC F-15 CRP NE-3A CRC	PATRIOT FU PATRIOT Bn FDC PATRIOT Bde FDC F-15 SIS Other Info Sources	PADIL ATDL-1 TADIL-A TADIL-B NATO LINK 1

APPENDIX C

IFFN PROGRAM FUNDING PROFILE ESTIMATE

15 October 1983

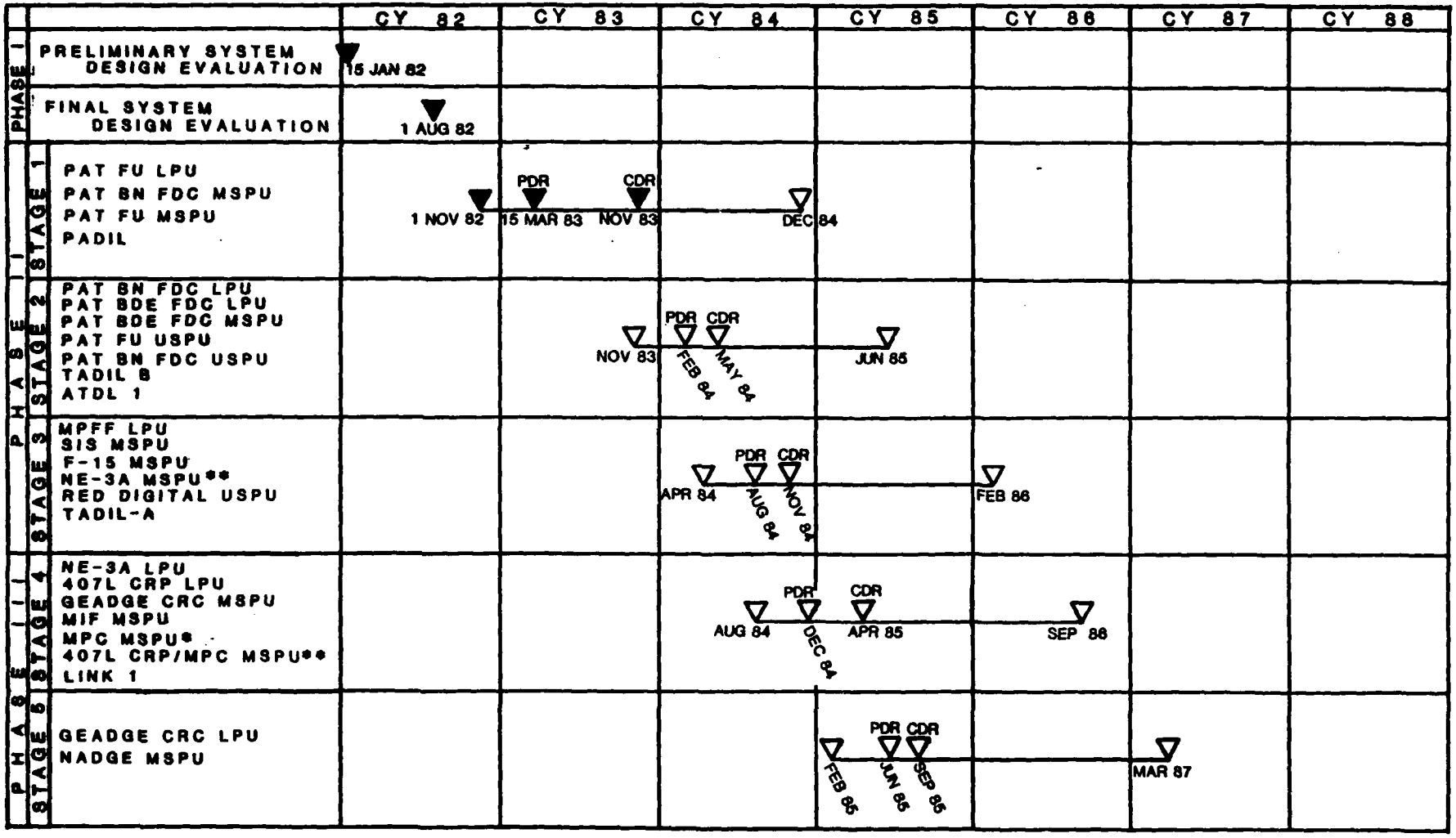
FY79-81	FY82	FY83	FY84	FY85	FY 86	FY 87	FY 88	Total
$4.4	$17.7	$10.0	$14.9	$20.1	$13.1	$10.6	$4.4	$95.2

Figures Include:

- Contracts
- Travel
- Communications
- Supplies and Equipment
- Management Support
- IDA

APPENDIX D

IFFN TESTBED ACQUISITION SCHEDULE

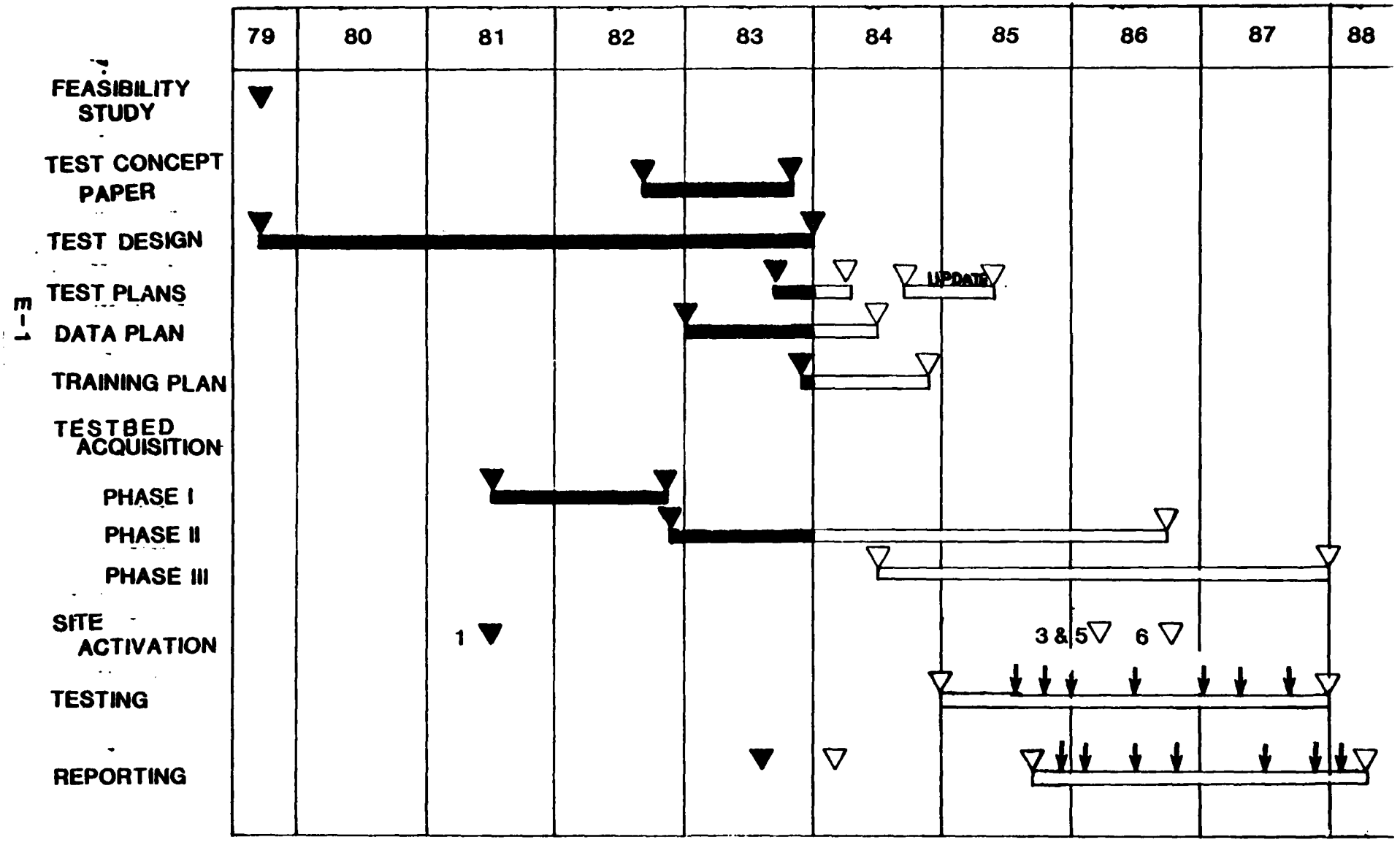


* IF MPC GFE CANNOT BE PROVIDED

** FOR TEST REHEARSAL AND SCENARIO REVIEW ONLY

APPENDIX E

IFFN MASTER SCHEDULE



APPENDIX F

SERVICE RESOURCE REQUIREMENTS

This appendix contains the information on personnel, equipment and facilities requirements from the Services in order for the JTF to conduct the IFFN JT&E. It is separated by Service and provides the information in sufficient detail for the Services to generate their respective support plans (Air Force - TPO, Army - OTP).

I. Air Force

A. Air Force Personnel Requirements

Position	Grade	AFSC	Rqrd Dates (FY)
Test Director	0-6	0036	79-88
AF Deputy Test Director	0-6	0036	79-88
Dir, Resource Management	0-5	0056	80-88
Dir, Test Operations	0-5	0036	80-88
Ops Rqmts Off	0-5	2816	84-88
Dir, Data Automation	0-5	5176	80-88
USAFE Liaison Officer	0-5	2275Y	84-88
Ch, Business Mgmt Div	0-4	2816	80-88
Dep Ch, Detachment 1 Note 1	0-4	1716	82-88
Ch, Air Force Test Ops Div	0-4	1716	82-88
Ch, Detachment 3 Note 3	0-4	1716	85-88
Fighter Ops Off	0-4	1455K	82-88
Ch, Detachment 6 Note 6	0-4	1716	85-88
Ch, Support and Evaluation Div	0-4	8016	82-88
System Engr	0-4	5164	80-88
Ch, Test Support Div	0-4	5116	80-88
Ch, Communications and Tng Div	0-4	3055	80-88
Ch, Training Branch	0-4	1716	81-88
Ch, Contracts Branch	0-3	6534	80-88
Contracting Off Rep	0-3	6534	83-88
Chief, Cmd & Control Br	0-3	1744F	80-88

Position	Grade	AFSC	Rqrd Dates (FY)
Ch, Detachment 8 Note 8	0-4	5135B	82-88
Weapons Controller Note 5	0-3	G1744D	85-88
E3A Ops Off	0-3	G1744G	84-88
C^2 Ops Off	0-3	1744F	82-88
Scientific Analyst	0-3	2685	81-88
Ch, Computer Ops Branch	0-3	5155	80-88
ETS TRCO	0-3	5135D	81-88
IV&V TRCO	0-3	5135C	81-88
Cost and Mgmt Analyst	0-3	6924	83-88
Elec Warfare Officer	0-3	2275P	83-88
Financial Mgmt Supt	E-8	67299	80-88
Chief, Central Admin Div	E-8	70299	80-88
NCOIC, Computer Ops Br	E-7	51170	80-88
Cost and Mgmt Analyst	E-7	69170	82-88
Communications Supt	E-7	30770	80-88
NCOIC, Air Force Test Ops Div	E-7	27470	81-88
Acceptance Test Mgr	E-7	51171	81-88
Chief, Supply Unit	E-6	64570	80-88
NCOIC, Trng Br	E-6	27470	81-88
NCOIC, Software Mgmt Br	E-6	51171	81-88
Pseudo Pilot	E-6	27670	85-88
Simulator Operator	E-6	27670	84-88
NCOIC, Tech Document Br	E-5	70250B	80-88
QA Monitor	E-5	51151	81-88
Admin NCO	E-5	70250B	81-88

Position	Grade	AFSC	Rqrd Dates (FY)
Staff Cmd Post NCO	E-5	27450	82-88
Simulator Operator	E-5	27650	84-88
Simulator Operator	E-5	27650	84-88
Simulator Operator	E-5	27650	84-88
Acceptance Test Mon	E-5	51151	82-88
Computer Operator	E-5	51150	83-88
Senior Scientist	GS-14		84-88
Ch, Assurance Mgmt Br	GS-12	6524	81-88
Senior Ops Analyst	GS-12	2685	84-88
Secretary/Steno	GS-6	70270	80-88
Secretary/Steno	GS-5	70270	80-88
Secretary/Steno	GS-5	70270	80-88
Secretary/Steno	GS-5	70270	80-88
Secretary/Steno	GS-5	70270	80-88
Secretary/Steno	GS-5	70270	82-88
Secretary/Steno Note 5	GS-4	70270	82-88
Secretary/Steno Note 3	GS-4	70270B	85-88
CM Clerk Typist	GS-4	70270	82-88
Clerk/Typist	GS-4	70250B	81-88
Secretary/Typist	GS-4	70270	81-88
Secretary/Typist	GS-4	70270	83-88

Note 1 Ft Bliss, TX

Note 3 Hurlburt Fld, FL

Note 5 Avionics Integration Lab, Seattle, WA

Note 6 Fullerton, CA

Note 8 San Diego, CA

B. Air Force Equipment and Facilities Requirements

1. Air Force Rentals

Item	Qty	Location	Reqd Date (FY)
Copier	2	Kirtland AFB NM	83-88
Copier	1	Seattle WA	85-88
Copier	1	Hurlburt Fld FL	86-88
Copier	1	Ft Bliss TX	83-88

2. Communications Equipment

Item	Qty	Reqd Dates (FY)
Dedicated Computer Data Telephone Line	16	83-88
KG 13/84	36	83-88

3. Range and Test Facility Support

Item	Qty	Location	Reqd Dates (FY)
Central Simulation Facility (CSF) (13500 sq ft)	1	KAFB	81-88
Housing for IFFN Personnel on/off Base	107	KAFB	81-88
407L CRP/MPC	1	Hurlburt FLd	86-88
Office Space (4 personnel)	1	Hurlburt Fld	86-88
Truck, ½ ton or less	1	KAFB	80-88

4. Service Contracts

Item	Location	Reqd Dates (FY)
GEADGE CRC	Fullerton CA	85-88
Contract for CSF Software and Hardware	KAFB	80-88
E3A Mission Simulator	AIL, Seattle WA	85-88

5. Supplies

Item	Qty	Location	Reqd Dates (FY)
Office Supplies	94 Personnel	KAFB	83-88
Office Supplies	3 Personnel	Seattle WA	85-88
Office Supplies	4 Personnel	Hurlburt Fld	86-88

6. Other Equipment

Other equipment necessary includes office furniture, typewriters, projectors, microfiche viewers, calculators, telecopiers, safes, word processors, etc. These are too numerous to list in this document and can be determined by contacting the JTF.

II. Army

A. Army Personnel Requirements

Position	Grade	MOS	Rqrd Dates (FY)
USA Deputy Test Director	0-6	51B14	79-88
Chief, Detachment 1 Note 1	0-5	14D51	82-88
Dep Dir, Data Automation	0-4	53A14	81-88
Dep Dir, Resource Management	0-4	42A54	81-88
Dep Dir, Test Operations	0-4	14D54	80-88
Ch, Army Test Ops Div	0-4	51B14	80-88
Comptroller	0-3	97B45	80-88
Chief, Comm Br	0-3	25C53	80-88
Chief, Rqmts and Sim Br	0-3	49A14	80-88
Chief, Test Plans and Proc Br	0-3	14D54	81-88
C^2 Officer, Detachment 1 Note 1	0-3	14G54	81-88
PATRIOT Officer, Detachment 1 Note 1	0-3	14E54	82-88
Chief, Scenario Br	0-3	35B51	83-88
Dep Ch, Detachment 3 Note 3	0-3	14G51	85-88
C^2 Officer, Detachment 6 Note 6	0-3	14G51	85-88
PATRIOT Off, Detachment 6 Note 6	0-3	14E51	85-88
C^2 Officer, Detachment 7 Note 7	0-3	14G51	85-88
Ch, Analysis Br	0-3	49A14	81-88
Ops Analyst, Analysis Br	0-3	49A14	81-88
Chief, Software Mgmt Br	0-3	53A14	81-88
Chief, ETS Development Div	0-3	53A14	81-88

Position	Grade	MOS	Rqrd Dates (FY)
Chief, Stage Mgmt Branch	0-3	53A14	81-88
Stage Mgr	0-3	53A14	84-88
Stage Mgr	0-3	53A14	84-88
Data Mgr	CWO	741A	84-88
NCOIC, Detachment 1 Note 1	E-7	16H40	81-88
QA Mgr, Assur Mgmt Br	E-7	74F40	84-88
NCOIC, Test Plans & Proc Br	E-7	16H40	82-88
CM Mgr, Assur Mgmt Br	E-7	74F40	84-88
NCOIC, Central Admin Div	E-6	71L30	80-88
Pseudo Pilot	E-6	16H30	85-88
Ch, Scheduling and Test Mgmt Br	E-6	16H30	81-88
Simulator Operator	E-6	16H30	84-88
Controller/Operator, Trng Br	E-5	16H20	82-88
Admin Specialist	E-5	71L20	81-88
Acc Test Mon, Assur Mgmt Branch	E-5	74F20	82-88
Programmer, Software Mgmt Branch	E-5	74F20	82-88
Simulator Operator	E-5	25L20	84-88
Simulator Operator	E-5	25L20	84-88
Simulator Operator	E-5	25L20	84-88
Simulator Operator	E-5	25L20	84-88
Simulator Operator	E-5	25L20	84-88
Scheduler, Schd & Test Mgmt Br	E-4	16H10	82-88
Clerk Typist, Detachment 1 Note 1	GS-4	31804	81-88

Note 1 Ft Bliss, TX

Note 3 Hurlburt Fld, FL

Note 6 Fullerton, CA

Note 7 PT Loma, CA

B. Army Equipment and Facilities Requirements

1. Range and Test Facility Support

Item	Qty	Location	Reqd Dates (FY)
PATRIOT FU (PTOS)	1	Ft Bliss	84-87
PATRIOT Bn FDC (PTOS)	1	Ft Bliss	85-87
PATRIOT Bde FDC (AN/TSQ-73)	1	Ft Bliss	85-87

2. Operations Personnel (Test Facility)

	Personnel Description	Qty	Location	Reqd Dates (FY)
a.	PATRIOT Battery Crew			
	TCO (OFF) 14E	2	Ft Bliss	84-87
	TCA (NCO) 24T30/20	2	Ft Bliss	84-87
b.	PATRIOT Bn FDC Crew			
	TCO (OFF) 14E	2	Ft Bliss	85-87
	TCA (NCO) 24T40/30	2	Ft Bliss	85-87
c.	Brigade FDC Crews			
	TAC Dir (OFF) 14G	2	Ft Bliss	85-87
	Asst Dir (NCO) 25L40/30	4	Ft Bliss	85-87
d.	CRC (Missile Control Center) Crew			
	SAMA (OFF) 14E or 14G	1	TBD	86-87
	SAMA Tech (NCO) 16H30 or 25L30	1	TBD	86-87
	MAO (OFF) 14E	2	TBD	86-87
	MAO Tech (EM) 16H10 or 25L10	2	TBD	86-87

3. Supplies

Item	Qty	Location	Reqd Dates (FY)
Office Supplies	6 Personnel	Ft Bliss	81-88

4. Other Equipment/Facilities

Other equipment/facilities necessary includes office space for six (6) JTF and five (5) contract personnel at Ft Bliss, office furniture, typewriters, telecopier, projector, telephones, etc. These are too numerous to list in this document and can be determined by contacting the JTF.

III. Other

Additional personnel requirements exist for which the authorization source has yet to be determined. Possible sources of authorization are military or civil service personnel from one or both of the Services or contract hire.

Position	Grade	AFSC/MOS	Rqrd Dates (FY)
Computer Operators (8)	E5	51150/74D20	84-88
Computer Programmers (4)	E5	51151/74F20	84-88

APPENDIX G

PMP ACRONYMS LISTING

4ATAF	Fourth Allied Tactical Air Force
ABL	Allocated Baseline
AD	Data Automation Directorate
AFB	Air Force Base
AFOTEC	Air Force Operational Test and Evaluation Center
ATDL-1	Army Tactical Data Link-1
BDE	Brigade
BN	Battalion
BVR	Beyond Visual Range
CAT I	Category I Hardware Tests
CDR	Critical Design Review
CI	Configuration Item
CIS	Combat Identification System
CISPO	Combat Identification System Program Office
CM	Configuration Management
COMSEC	Communications Security
COR	Contracting Officer Representative
CPAF	Cost Plus Award Fee
CPC	Computer Program Component
CPCI	Computer Program Configuration Item
CPT	Computer Program Tests
CRC	Control and Reporting Center
CRP	Control and Reporting Post
CSF	Central Simulation Facility
CSS	Central Simulation System
C^2	Command and Control
C^3	Command, Control and Communications
C^3I	Command, Control, Communications and Intelligence
DCA	Design Configuration Audit
DDR&E	Director, Defense Research and Engineering
DDT&E	Director Defense Test and Evaluation
DO	Test Operations Directorate
DoD	Department of Defense
DPM	Deputy Program Manager
DSS	Direct Subsystem
DTD	Deputy Test Director
DTG	Date Time Group
ECM	Electronic Countermeasures
ECS	ETS Communications Subsystem
ETS	Evaluation Testbed System
FBL	Functional Baseline
FCA	Functional Configuration Audit
FDC	Fire Direction Center
FSDE	Final System Design Evaluation

FT	Functional Tests
FU	Fire Unit
FWG	Financial Working Group
FYDP	Five Year Development Plan
GEADGE	German Air Defense Ground Environment
GFE	Government Furnished Equipment
GFI	Government Furnished Information
HCI	Hardware Configuration Item
IAW	In Accordance With
IDA	Institute for Defense Analyses
IDR	Interim Design Review
IFF	Identification Friend or Foe
IFFN	Identification Friend, Foe, or Neutral
IOT&E	Initial Operational Test and Evaluation
IPO	Input-Process Out
ISS	Indirect Subsystem
IT	Integration Tests
IV&V	Independent Verification and Validation
JCS	Joint Chiefs of Staff
JFAAD	Joint Forward Area Air Defense
JINTACCS	Joint Interoperability of Tactical Command and Control Systems
JTD	Joint Test Director
JTDE	Joint Test Director Executive Officer
JT&E	Joint Test and Evaluation
JTF	Joint Test Force
LPU	Live Participating Unit
MC	Model Committee
MENS	Mission Element Needs Statement
MIF	Manual Input Facility
MIL STD	Military Standard
MOA	Memorandum of Agreement
MOE	Measure of Effectiveness
MPC	Message Processing Center
MPFF	Multi Purpose Fighter Facility
MSPU	Manned Simulated Participating Unit
NADGE	NATO Air Defense Ground Environment
NATO	North Atlantic Treaty Organization
NE-3A	NATO Airborne Early Warning System
NIS	NATO Identification System
NISPO	NATO Identification System Program Office
OAT	Operational Acceptance Testing
OPR	Office of Primary Responsibility
OR/SC	Operational Requirements/System Characterization
OSD	Office of the Secretary of Defense
OTEA	Operational Test and Evaluation Agency

OTP	Outline Test Plan
OUSDRE	Office of The Under Secretary of Defense for Research and Engineering
PADIL	PATRIOT Air Defense Information Language
PBL	Product Baseline
PCA	Product Configuration Audit
PDR	Preliminary Design Review
PM	Program Manager
PMP	Program Master Plan
PPS	Program Performance Specifications
PRR	Program Requirements Review
PSDE	Preliminary System Design Evaluation
PU	Participating Unit
PUSIM	Participating Unit Simulation
QA	Quality Assurance
RM	Resource Management Directorate
RTS	Real Time Test Subsystem
SAC	Senior Advisory Council
SAM	Surface-to-Air Missile
SDP	Support Data Processing
SIS	Special Information System
SOW	Statement of Work
SPU	Simulated Participating Unit
SSS	Satellite Simulation Subsystem
SSU	Satellite Simulation Unit
ST	Special Hardware Tests
TAB	Technical Advisory Board
TAC	Tactical Air Command
TACS/TADS	Tactical Air Control Systems/Tactical Air Defense Systems
TADIL	Tactical Digital Information Link
TCM	Test Control Monitor
TDA	Deputy Test Director, Army
TDF	Deputy Test Director, Air Force
TOR	Testbed Operational Requirements
TPO	Test Program Outline
TRCO	Technical Representative to the Contracting Officer
TSP	Tactical Simulation Program
USAF	United States Air Force
USDRE	Under Secretary of Defense for Research and Engineering
USPU	Unmanned Simulated Participating Unit
VBD	Version Baseline Delivery
V&V	Verification and Validation

APPENDIX H

MODEL DEVELOPMENT PROCESS

Purpose. The purpose of this annex is to describe the model development process for representing systems within the Identification Friend, Foe, or Neutral (IFFN) Evaluation Testbed System (ETS). The development process described within this annex will apply to those models that supplement the tactical hardware/software comprising the live participating unit (LPU) and manned/unmanned simulated participating units (MSPU/USPU), hereafter known as a participating unit (PU). The testbed will employ computer models in cases where well defined physical processes are to be modeled or where the fidelity requirements for representing the man-machine interaction are less severe. These models fall into two categories: interactive and noninteractive.

o Interactive models react dynamically (in real-time) to perceived changes in the air battle situation. They may receive inputs such as data link messages from the other models or LPUs and may initiate messages either on their own or in response to stimuli. The output of these models is not predetermined and is conditional on the specific dynamics of the air battle. The applications for interactive models will be as follows:

- Sensor models: these must react to events such as aircraft kills, removal of jammers, and selection of operating modes.

- Missile models: real-time interactive missile models will be employed to accomplish real-time removal of killed aircraft.

- Dynamically controlled aircraft models: these will represent those aircraft in the scenario whose flight trajectories and actions are reactive to the air battle environment in realtime without human interaction.

o Noninteractive models do not react to the air battle dynamics. They are a less complex class of models and simply generate selected messages and actions at preprogrammed times according to a script prepared prior to the test. The models are considered suitable for emulating those facilities that do not dynamically interact with the identification process, but that provide orders, procedures, and other information on a one-way basis. This would apply to certain higher echelon planning facilities. Noninteractive models will also be the means of representing those aircraft following programmed flight profiles which are not automatically reactive to the air battle environment or under pseudopilot control.

General Model Requirements and Philosophy. Three general levels of computer models are required to support test operations.

o Level 1 Models: These models represent processes or functions that directly influence the identification process and interact directly with the equipment and personnel of an LPU. They will present realistic information, responses and displays to LPU components and possess sufficiently realistic overall performance in areas that would affect the identification process.

- In sensor models, detection ranges of targets (by specific aircraft

type/configurations) are intended to provide close (± 10%) approximations of actual detection ranges. They are not intended to be refined to a level which would permit use to predict actual real-world system performance for analytical purposes particularily under marginal operating conditions such as heavy ECM or clutter conditions where operator skills become critical to system performance.

- Display quality of raw video, when modeled, must be such that operators will not be able to discern the difference between simulated displays and "live" displays. This must be true in all specified types of ECM as well as terrain or velocity clutter.

- Display quality of processed video displays must emulate all characteristics of the real system.

- Special response characteristics of sensor models which affect either the operator, the tracking system or both must be emulated so that operators cannot distinguish between the real and simulated target responses. One example is the characteristic response of the Improved Hawk High Power Illuminator Radar to helicopter rotary wing blade modulation.

- IFF responses, both sensor system and displays, must be modeled equivalent to live operations.

- For models representing sensors organic to an LPU, the actual point of signal insertion will differ and be a function of the design and construction of each sensor. Since less modeling is required as more of the actual system is used, as a general rule, signals should be inserted as close to the sensor antenna as possible. These models must take into consideration any processing loss, such as between antenna, receiver and signal insertion point. There is no requirement, nor is it intended to simulate and inject RF signals at the antennas themselves.

o Level 2 Models: These models represent processes or functions that provide inputs to the actual manned modes in the context of the scenario in progress. The models must provide realistic information and responses to the LPUs, however, the actual process need not be duplicated.

- In sensor models detection ranges need only be modeled on the basis of nominal detection curves versus target cross-section presented. The nominal detection ranges should be reduced by a factor which would allow for lag between detection and track establishment. Low altitude effects should be accounted for by coarse factors, and target cross-section effects also accounted for on a much coarser scale than Level 1. Two points must be remembered when considering these models.

* All targets in the area of responsibility which provide "trackable" signals based on the above criteria, must produce tracks.

* The track generation of the simulation must be generally "true to life" so that targets in areas of system overlap are normally visible to both the manned and unmanned nodes. This factor obviously produces an effect at a point where simultaneous track reports are available.

- Level 2 models of simulated participating units will provide, on

demand, the air situation as seen by the simulated system in a prescribed symbology format. They need not be capable of generating sensor video presentations.

- Whenever special response characteristics show as effects on data link transmissions, they should be incorporated into the model.

- Modeled IFF interrogation patterns may either be preprogrammed or directly controlled by a simulation controller. IFF returns affect simulation tracks only in a gross performance sense in accounting for jamming or other known undesirable signal characteristics. For certain types of scenarios, the IFF effects on the simulated systems must be capable of rapid reprogramming by the simulator controllers during a trial run to maintain realism.

o Level 3 Models: These models represent processes or functions that provide background effects, produce non-interactive responses or do not directly interact with LPUs. They need only provide very coarse representations to input tracks or information to the system for realism.

Model Committee. A Model Committee was chartered to provide technical support to the Joint Test Force (JTF) in those disciplines not readily available in assigned personnel. The Model Committee consists of technical representatives from each of the participating services, Institute for Defense Analyses (IDA), Logicon, JTF staff, and other industry and government experts as deemed necessary to evaluate candidate PU System models. The Model Committee is strictly a supporting forum that will review and assess models proposed by Logicon and make recommendations and advisements to the Joint Test Director (JTD) through the JTF staff. Logicon will, in turn, receive direction from the JTD to alter models appropriately. The Model Committee will be exercised through the organization shown at TAB A. The Model Committee, at the working level, will be allowed to organize as they see fit to best utilize the expertise available to accomplish goals/objectives. Block coordinators will be assigned from the JTF to guide the actions of the various subgroups. They will also be responsible for collating and providing to the Model Committee Chairman inputs for minutes and aid in preparing recommendation to JTD. The Model Committee Chairman will be from the Test Operations Directorate (DO) and selected by the Director. The Data Automation Directorate (AD) will provide technical assistance/advisement to DO on modeling. The Chairman will be responsible for determining when meetings will be held, inviting members, preparing an agenda, chairing the meetings, providing appropriate materials/documents, preparing recommendation to JTD, preparing/distributing minutes, providing feedback to members, and overall coordination with Logicon on model effort. The Deputy Test Directors (DTDs), Steering Group, and IDA Project Leader will act in an advisory capacity to the JTD. Detailed responsibilities for the modeling process will be discussed later.

Model Development Process. The modeling process, as illustrated in TAB B, is a dynamic, iterative process. This process will apply to each phase of program development. Once the testbed system requirements, as stated in the Type-A Specification and Testbed Operational Requirements (TOR) are analyzed to establish the scope and level of modeling detail, the submodels for each IFFN ETS PU will be developed in accordance with a design, implementation, and testing process for which major activities will occur and products be developed. The following steps will constitute the development process:

o Define Operational Requirements/System Characterization (OR/SC). The JTF (DO-lead), in conjunction with IDA and the Services, will determine and verify systems and environment to be represented. Before a PU can be represented by a set of submodels, the JTF will acquire an understanding of the performance and operational characteristics of the system to be modeled. The depth of this understanding is guided by A-Spec requirements, MOEs, test objectives, service requirements, technical and operational procedures, data to be collected, and is a product of analyzing the following real-system definition/performance documents:

- PU System Specification
- Functional Requirements Specification
- Detailed Design Specification
- Interface Design Specification
- System Description Manuals
- Operational Manuals
- System User Manuals
- Training Manuals

In addition to these document analyses, the OR/SC is also based on data gathered from direct observation and/or demonstration of the actual system, as well as information provided by operators of the actual system. The JTF will then prepare an OR/SC package for presentation to Logicon to include:

- Operational Overview
- Functional and Data Flow Diagrams
- Detailed Technical Outline
- Interface Diagrams
- Performance Factors
- Operational Factors
- Model Inputs/Outputs
- Effects to be Included
- Interactions with other Testbed Elements

The format for this package will be in the form of an operational requirements annex to the TOR. In parallel with JTF efforts, Logicon will be performing essentially the same tasks developing their own system characterization (Ref: Model Requirements Document). The JTF package will provide our philosophy, conceptual guidance, and operational requirements to Logicon. Between the two

efforts, an interactive process will evolve to provide a check and balance on the two efforts to ensure PU systems are accurately portrayed, define required model fidelity, and detailed performance/operational features. The OR/SC development step will be the product of the Program Requirements Review (PRR). The PRR is conducted 30 days prior to the beginning of each stage to ensure that program requirements specific to the particular PU being integrated during that stage of development will support test objectives, test design, and test plans. The operational requirements package will be used to update the A-Spec. While trying not to fall into a "design to" process, the JTF will reserve the right to, on a case-by-case basis to be able to exert a positive influence on model design and eliminate contractor misinterpretation of requirements. Once agreed upon, Logicon will commence model construction. The relationship of this procedure to the program's overall documentation scheme is shown at TABS B and C.

o Model Construction/Development. Model construction/development will take place in four steps:

- Baseline Model Definition
- Preliminary Model Specification
- Final Model Specification
- Model Product Baseline

A review of each step of development will be done by the JTF and the Model Committee (through document review or formal Model Committee meeting), with recommendations made to JTD as to suitability of models. The four steps as to contents, deliverables, and responsibilities are:

o Baseline Model Definition. The Baseline Model Definition provides an overview of PU system features to be modeled, and provides an initial statement of what functions and techniques are necessary to simulate those features. The system characterization data is the starting point for the baseline model definition development. Deliverable documents of PU consideration will include (not contract deliverables, but delivered by Logicon in support of JTF/Model Committee review activities):

- Operational Overview
- System Characterization
- Baseline Model Definition

These documents will provide the following engineering data:

- Identification and definition of performance factors
- Identification and definition of key functions
- Identification and definition of modeling techniques
- High level Input-Process-Out (IPO) diagram for each submodel

Document delivery (30 days after start of stage) will be included in the Program Plan and Schedules document. Selected Model Committee members (determined by block coordinators) will receive copies of documents and be asked to review/assess and provide comments to JTF. No formal Model Committee meeting will be convened for this step. Detachment 8 will be responsible for forwarding documents to Model Committee members. An OPR from DO will collate JTF and Model Committee comments and provide a recommendation to the JTD as to the suitability of system model at this point. The JTD, through the TRCO, will provide feedback to Logicon and the Model Committee Chairman to the Model Committee. Logicon will use that feedback in developing the next step in the process.

o Preliminary Model Specification. The Preliminary Model Specification describes in detail all the operational and functional requirements necessary to design and test the submodels representing the PU Systems. It will include the IPO specifications and model interface diagrams for each submodel, plus, define model data bases to include performance tables for table-driven models. Document delivery will be included in the Program Plan and Schedules Document as a part of PDR deliverables. Det 8 will be responsible for forwarding document to Model Committee members. Model Committee chairman will provide Detachment 8 with a cover letter and a mailing list. There will be a formal Model Committee meeting in conjunction with PDR, and will coincide with PDR review dates so that Model Committee comments can be integrated into PDR comments. Model Committee Chairman will be responsible for determining when Model Committee will meet and for preparing an agenda/goals for the meeting. Model Committee Chairman will chair meeting and ensure Model Committee members adhere to schedule with the aim of satisfying goals. At the termination of Model Committee meeting, Service coordinators (MC Chairman) will collate Model Committee comments and recommendations and prepare a coordinated staff assessment to the JTD. The JTD will use this in determining his position on Logicon's modeling effort. Feedback to Logicon will be through the PDR process/format/schedule for providing JTF review of documentation. Feedback to the Model Committee will be in the form of newsletter. Model Committee Chairman will be responsible for preparing and forwarding newsletter. Logicon will use feedback in developing the next step in the process.

o Final Model Specification. The Final Model Specification will be an updated and completed version of the Preliminary Model Specification. Document delivery will be in conjunction with CDR and IAW Program Plan and Schedules Document. The Final Model Specification will be issued as a part of the PUSIM Program Performance Specifications (PPS). Logicon will identify sections pertinent to modeling; Detachment 8 will forward documents to Model Committee members for review and comment. There will be a formal Model Committee meeting scheduled in conjunction with CDR and will coincide with CDR schedule. Responsibilities will be as in the aforementioned discussion. Logicon will use feedback in developing the next model development.

o Model Product Baseline. The Model Product Baseline reflects the detailed design, coding, and testing based on the Final Model Specification in the corresponding PUSIM PPS. Each PPS will generate a series of design and test documents. In addition, there will be common interface and data base documents. The resulting list of documents, defining the Model Product Baseline, include the following:

- Program Design Specification
- Program Design Descriptions
- Interface Design Specifications
- Data Base Documents
- Test Plans
- Test Specifications
- Test Procedures
- Test Reports
- Program Packages

Model Product Baseline documents will be included in the Version Baseline Delivery and IAW Program Plan and Schedules Document. Logicon will identify pertinent model documents and Detachment 8 will forward to Model Committee members for review. As this is the final software delivery, no formal Model Committee meeting will be held. Selected Model Committee members will be asked to review models during operational acceptance testing.

o Certification. Certification is an administrative procedure performed to ensure enough evidence is available (model accurately portrays PU in enough fidelity to satisfy testing requirements/objectives) to state, with near certainty, that the system will satisfy the user's need. Certification will be an ongoing process commencing with the four-step review process by the JTF and Model Committee and concluding with Service acceptance of models. In order to ensure that an adequate Service certification process is accomplished on the models, the proper representation from within the Services will be identified and sit on the Model Committee. The IFFN Deputy Test Directors (IAW Model Charter) will coordinate with each Service on a single agency to review and pass judgment on final model versions of models. Final certification of models will be a subset of overall testbed certification.

o Operational Acceptance Testing (OAT). OAT is a demonstration under operational conditions to show that the testbed performs in accordance with the Government's specifications and satisfies all Government requirements. Although successful OAT may not meet certification criteria, it will be observed and reviewed by the JTF, Services, and Model Committee as a part of model certification. The following steps will establish certification review process during OAT:

- Establish criteria
- Collect reference data from field exercises, etc
- Observe/record test data
- Analyze test data against reference data

- Refine models as required

- Implement changes

- Accept model for testbed operations

- Implement model in testbed

o Verification and Validation. Throughout the model development process, SAI will conduct an independent, in-depth model requirements analysis through review of all model documents. SAI will perform the review and evaluation in a quantitative manner to determine the suitability and approach to modeling regarding:

- Traceability between models and requirements from higher-level documentation.

- Completeness and compatibility with other models and requirements.

- Degree of fidelity necessary to meet requirements.

- Model performance and computational demands placed on the ETS.

- Sufficient detail and adequacy of model descriptions.

SAI will provide a report to the JTF summarizing their review, giving anomalies discovered during the review and comments regarding implementation risks. This V&V process, as well as the Model Committee actions, will provide another measure of checks and balances to ensure model correctness and credibility.

o Schedule. A schedule is shown at TAB C. Dates will be determined based on Program Plan and Schedules Document. Dates will be entered into Project Management System for tracking/update.

o Responsibilities. Some responsibilities are laid out in earlier discussion. Pertinent personnel/agency responsibilities are delineated:

- DO. Primarily responsible for determining PU system characteristics and operational requirements. DO will support Logicon in their efforts to define same. Refine model requirements through the TRCO process, then review for operational considerations. Interface with Model Committee members and Service agencies to resolve issues and recommendations. Interface with rest of staff on schedule. Chair Model Committee. Provide inputs into certification/OAT.

- AD. Primarily responsible for analyzing the acquisition schedule to determine what products (GFI, documents, operational requirements, system characteristics, etc.) are required to support model milestones (PDR, CDR, etc.); these to come from JTF staff or from outside agencies. Responsible for review of model technical specifications. Will establish TRCO process for providing feedback to Logicon. Interface with Model Committee members on issues and concerns (meetings, telephone, message, etc.). Provide inputs to certification/OAT.

- RM. RM will incorporate AD/DO inputs into a schedule and enter it into the Project Management System, and then track and update schedule, as required. They will also handle funding requests for Model Committee members. Contracting expertise may be required if outside agencies such as ECAC, JTCG, etc. are used.

- Model Committee Chairman. Chairman will be responsible for all Model Committee activities. Duties will be to: determine block coordinators for each phase, track schedule, schedule, prepare agendas, and chair Model Committee meetings, coordinate with Logicon on meetings, deliverables, feedback, (etc.), write minutes and Model Committee newsletter, track membership, write/update charter, coordinate JTF model activities, and appoint OPRs for each phase.

- DTDs. Will request Service inputs/coordination, coordinate Service acceptance/certification/validation, advise JTD, and obtain Service personnel for OAT.

- JTD. Will approve model specifications and provide funding approval.

- JTDE. Will provide administrative assistance to Model Committee chairmen and staff, as required.

- Detachment 1. Aid in defining operational requirements/system characteristics, provide inputs to certification/OAT, and provide personnel for model review.

- Detachment 8. Will monitor Logicon's efforts, provide liaison between Logicon and JTF staff, and mail model documents to Model Committee members.

- Model Committee. Review, assess, and provide recommendations to JTD on model development/specifications. Review models during OAT.

- Logicon. Develop technical specifications for models and present to JTF through appropriate documentation. Brief same during Model Committee meetings. Interface with JTF and appropriate Service agencies during model development. Provide early documentation to Model Committee members for review prior to meetings through Detachment 8. Provide technical memos to the JTF and MC members after each MC meeting to reflect recommendations/changes/refinements to the models and/or modeling approach. Coding, testing, implementation, and refinement of models.

- Tech Support Contractor. SYSCON will be used in helping develop/determine operational requirements/system characteristics. Aid in model review and assessment. Analyze operational requirements against Logicon's model design.

- Verification & Validation Contractor. SAI will review model development documentation through each step.

- Services. Help determine operational requirements/system characteristics. Certify/accept final model products. Provide personnel for OAT.

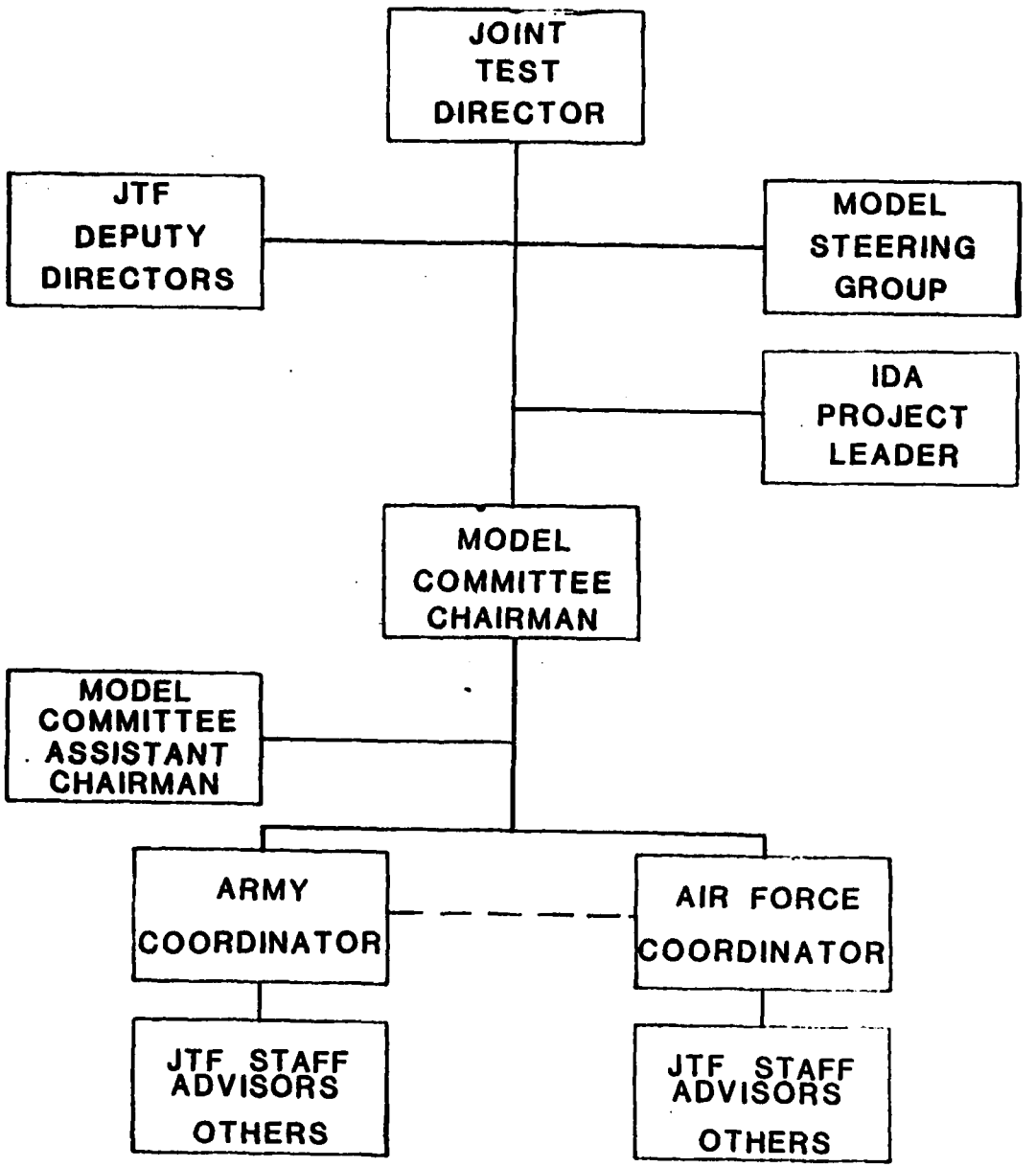
- IDA. Provide member(s) to Model Committee. Interpret test design. Aid in development of operational requirements/systems characterization.

- Steering Group. Advise JTD on model fidelity requirements, model development process, and certification. Other technical aspects of modeling/simulation development, as appropriate.

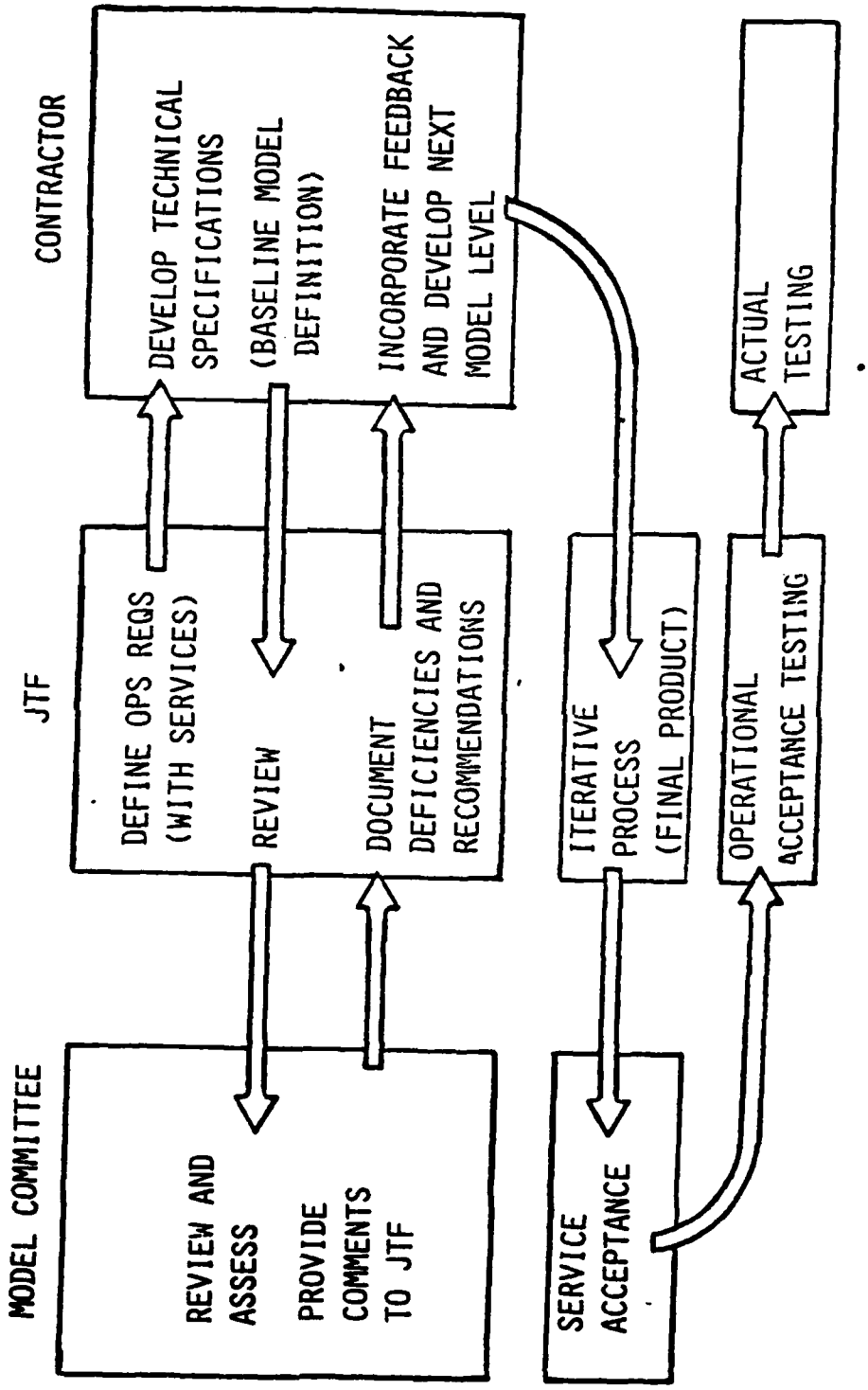
- Army/Air Force Coordinators. Provide interface between the JTF and advisors. Provide guidance and maintain direction of efforts toward accomplishing goals. Organize to efficiently and, in a timely manner, accomplish goals. Coordinate with other Service Coordinators. Report upwards to Model Committee Chairman. Aid in preparation of minutes.

- Summary. For the ETS to be credible, it must represent each element in a realistic manner. The model development process is the most important undertaking of the JTF staff to ensure the testbed is realistic and provides data to meet test objectives. It is a dynamic, iterative process that provides a logical, structured road map that integrates JTF objectives, Logicon design efforts, MIL-STD-1679 contract deliverables and milestones, and review by outside agencies/Services that will produce achievable outputs consistent with testbed requirements.

MODEL COMMITTEE ORGANIZATION

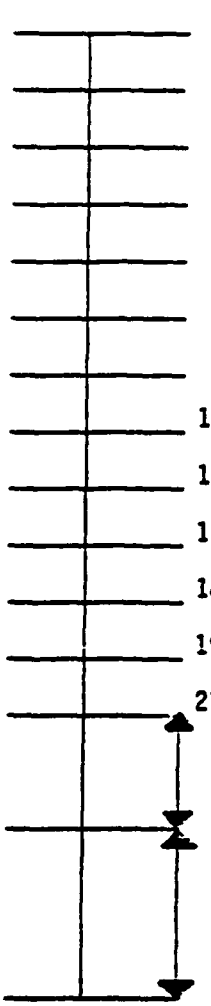


MODEL DEVELOPMENT PROCESS

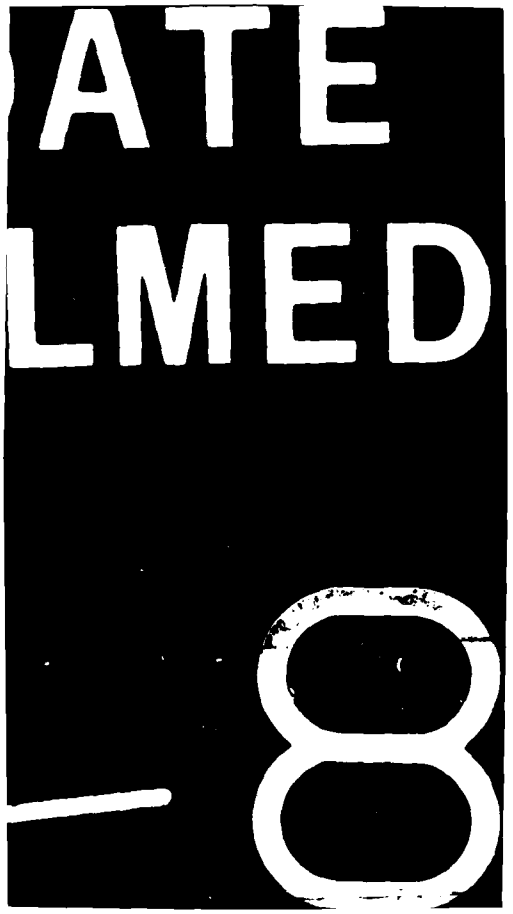


MODEL COMMITTEE SCHEDULE

Activity	Time
Program Requirements Review	30
Stage Start	0
Baseline Model Definition (BDM) Delivery (Mailed to MC)	30
Comments from MC	45
JTF Review Complete (JTF endorsement of BMD)	60
Preliminary Model Specification (PMS) Delivery (PDR) (Mailed to MC)	75
PDR	90
MC Meeting	100
PDR Review Complete (JTF endorsement of PMS)	120
Final Model Specification (FMS) Delivery (CDR) (Mailed to MC)	165
CDR	180
MC Meeting	190
CDR Review Complete (JTF endorsement of FMS)	210
Model Product Baseline (MPB) Delivery (Mailed to MC)	13 Months
Version Baseline Delivery	
Operational Acceptance Testing (Models reviewed by MC)	45 Days
JTF Endorsement of MPB	



Follow-on stage activities will always overlap with ongoing stage.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